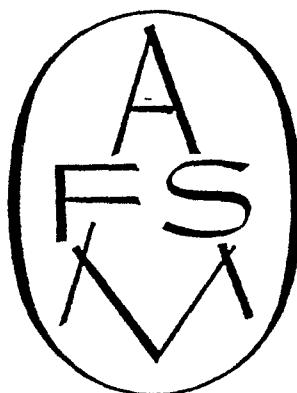


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VOLUME II

ARCHAEOLOGICAL DISCOVERIES IN SOUTH ARABIA

ARCHAEOLOGICAL DISCOVERIES



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THE DIRECTORS OF THE AMERICAN FOUNDATION
FOR THE STUDY OF MAN HAVE THE HONOR OF DEDICATING
THIS VOLUME WITH DEEPEST APPRECIATION TO

Alan and Sarah Scaife

FOREWORD

This volume deals with South Arabian material uncovered in Wadi Beihân (Western Aden Protectorate) and at Mârib (Yemen) by the American Foundation for the Study of Man, between 1950 and 1952.

Part I of this volume is devoted to the irrigation system in Wadi Beihân, which was investigated by Richard LeBaron Bowen during the 1950 campaign. Since the existence of the inhabitants of the arid Middle East, both in early and in modern times, depends on agriculture, the success of which largely rests on man's ability to find and conserve water, irrigation is essential and the systems used in ancient Arabia merit our attention. Although there have been studies of other irrigation systems, e. g., G. Caton Thompson's and E. Gardner's work in the Wadi 'Amd, the Beihân installation represents the most extensively studied and fully published one to date.

Unfortunately, it was not possible to study the Mârib dam and its place in the local irrigation system as originally intended. From time to time the site was visited and photographs were taken, the best of which are included here. It is our belief that every scrap of information about this structure is valuable and should be made known.

This section also includes three articles dealing with some of the finds recovered in the course of our excavations at Timna' in Wadi Beihân. The first of these, "The Lion Riders from Timna'" by Berta Segall, containing a full description of the lions and riders together with a discussion of the motif which they embody, is especially valuable for an understanding of South Arabian culture in the first century B.C. It supersedes all previous reports on the lions and riders, owing to the fact that many new details came to light when they were cleaned and restored by Joseph Ternbach, whose technical report is appended to this article.

The second article, "Inscriptions Related to the House Yafash in Timna'" by Albert Jamme, deals both with the text on the bases of the lions and with a group of related inscriptions from the house near which the lions were discovered. Taken together, they contribute much to our knowledge of the history of this building and supply important information bearing on the order of the Qatabanian kings of this period.

It might seem that the study of the "Imported Pottery and Glass from Timna'" by Howard Comfort should be reserved for the publication of the Timna' excavations. But since this material is of the greatest importance for South Arabian chronology, owing to the fact that it fixes the date of the final destruction of Timna' within narrow limits, we have included it here so that others may have access to the facts as soon as possible.

Part II is a study of the oval wall and entrance hall of 'Awwâm, the Temple of 'Ilumquh at Mârib, by Frank P. Albright. The architectural remains of this structure receive special attention in this section. Pottery, sculpture, and other small finds from the temple are recorded in a catalogue of objects at the end. The inscriptions will be published by A. Jamme and will appear in another volume.

We cannot claim to have adequately published this site and are aware of the shortcomings in this report. While the plan, measurements, and description of the temple are accurate, the drawings of many architectural elements and all of the small finds are prepared from the rough, schematic sketches made by Dr. F. P. Albright in his field notebook. Similarly, many items were not photographed at all and many of the photographs that appear here leave much to be desired from a technical point of view. The explanation for these inadequacies is to be found in the difficulties encountered by the expedition in Yemen. These circumstances have been described in *Qataban and Sheba* and need not be repeated here. While we regret the irreparable loss of the objects and squeezes, we are fortunate to have the plans, field notebooks, and photographs.

On behalf of the Directors of the American Foundation for the Study of Man, I wish to express grateful appreciation to the field staff of our expeditions, and to the contributors—governmental and academic organizations, corporations, companies, and individuals—who made this Arabian endeavor possible. In particular, I wish to record again my deep gratitude to Alan and Sarah Scaife for their continuing interest and generous support of our work both in the field and at home. It is our pleasure and honor to dedicate this volume to them.

80 Park Avenue
New York City, October, 1957

WENDELL PHILLIPS

PREFATORY NOTE

This is the first of a series of volumes covering the results of the South Arabian expeditions of the American Foundation for the Study of Man; work on their preparation continues actively at the Johns Hopkins University under my general editorship, with the generous support of the A. W. Mellon Educational and Charitable Trust and the Sarah Mellon Scaife Foundation. Two volumes are well advanced and should appear during the coming year or year and a half. Dr. Albert Jamme's publication of the inscriptions excavated at Mârib by our 1952 expedition is now completed and will go to press, *Deo volente*, as soon as the present volume has been issued. The Hajar Bin Humeid volume, by Dr. G. W. Van Beek and others, is far along toward completion and ought to be ready by the time the Jamme volume is off the press.

Other volumes will be devoted to the excavations at Timna' (South Gate, Temple Amir, and minor sites), the great cemetery of Timna' at Heid Bin 'Aqîl (part of whose inscriptions have already been published by Jamme), and the remaining inscriptions and graffiti recorded by Jamme. A monograph will be devoted to the excavations of Dr. Frank P. Albright in Dhofâr (1952), and studies on special topics will continue to appear in different organs. Part of this material is in manuscript form but much remains to be worked up into a form suitable for publication.

The task of preparing the present volume for publication has imposed a very heavy burden on the general editor and Dr. Van Beek, who has been our mainstay throughout, devoting most of his time for months to the work. Our contributors, now scattered over many states and several countries, have been throughout exceedingly cooperative. All contributors have been encouraged to keep on revising their work until it is in page proof, thus ensuring the maximum possible degree of accuracy. Special attention has been paid to the difficult problem of a sound and consistent chronology, in which the editors have been in constant touch with one another and the contributors. The chronology here employed agrees with that presented by the general editor in early September, 1957, at the Munich Congress of Orientalists, and outlined in detail in the forthcoming chapter on Pre-Islamic Arabia in Oldenbourg's *Abriss der Weltgeschichte*.

Without the continuing interest, support, and advice of Dr. Wendell Phillips neither expeditions nor publications would have come into existence; this volume is thus in a very real sense his contribution to world archaeology.

W. F. ALBRIGHT

16th September, 1957

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P A R T I

thought that the Arabians were fabulously wealthy, and that they had huge stores of gold and silver, which they received for their frankincense, myrrh, and other commodities, but never spent for other goods. Augustus, obviously influenced by these reports, dispatched an expedition under Aelius Gallus in 24 B.C. to either conciliate or subdue the Arabians. The Roman expedition marched 1200 miles from the newly conquered Nabataean Kingdom in Midian, but got only as far as Mârib. A siege of Mârib was given up because of lack of water, and the expedition turned back, apparently satisfied that Arabia Felix was nothing but an unfriendly and inhospitable desert country.⁴

Thus the Romans knew the South Arabian kingdoms and were familiar with their people and their land. However, with the collapse of the Roman Empire and the explosive rise of Islam, the ancient South Arabian kingdoms were virtually forgotten. The first European to explore Yemen after Aelius Gallus was Carsten Niebuhr, who visited the coastal areas in 1763. It was not until 1811 that the West first got a glimpse of the script of the ancient South Arabians. That script is now called "Himyaritic," a generic term covering all the various dialects. In 1870 Halévy collected about 600 of these inscriptions and from 1882 to 1894 Glaser collected nearly 2000.

Up to the present time little archaeological work has been done in the area which stretches from Hadhramaut to Yemen. In 1937-38 Miss Caton Thompson excavated a small temple and some tombs at Ḥureidha in Wadi 'Amd in Hadhramaut, while in 1928 Rathjens and von Wissmann cleared a temple at Ḥuqqa in Yemen. The American Foundation Arabian Expedition was the first major archaeological expedition to enter South Arabia; it spent its first and second seasons in Beihân, its third in Mârib, and its fourth in Dhofâr.

Beihân is one of the numerous mountain valleys which run northward into the desert from the mountain massif in the southwest corner of Arabia (Plate 34). The mountains of the Beihân area disappear abruptly under the great sand area of the Ramlet Sabatein. To the west of Beihân is Wadi Harib, half in the Aden Protectorate and half in Yemen. Past Wadi Harib,

the mountain range swings north. Along the edge of this strip of mountain, Mârib is located. It was in Beihân that the ancient kingdom of Qatabân was centered, while Mârib, only 65 km. away, was long the capital of the kingdom of Saba'. Beihân is liberally strewn with evidence of the ancient Qatabanians. Remains of their cities are found in many places, and in the hills and mountains are numerous examples of their quarries, paved paths and roads, passes, and villages (Frontispiece). But the most striking Qatabanian monuments are the remains of their desert irrigation. A comprehensive study of the ancient irrigation carried out in Beihân is presented in a later section.

The irrigation systems were constructed mainly of soil. Only the sluices and other parts where resistance to erosion was essential were constructed of stone. These now appear as ruin-heaps on the ancient fields. The methods of irrigation practiced by the ancient Qatabanians produced astounding depths (or heights) of silt. In some places this silt reaches 15 and even 18 m. above the wadi beds. In the 1500 odd years since the systems fell into ruin, natural erosion has cut grotesque patterns in the silt and made miniature canyons, as the *seil* rapidly cut its way down to wadi level. It is no exaggeration to say that the remains of the ancient Qatabanian fields form the most prominent geographical feature in Beihân.

TELL TOWNS

Closely related to the ancient Qatabanian fields are the remains of ancient towns and cities. Some modern towns in Beihân are built on top of the ancient fields, usually on the brink of a wadi, with a more-or-less flat silt area around. It may be assumed that the sites of these towns are relatively modern, since there is usually little erosion around them and they are not built up appreciably above the mean silt level. Examples of such towns are seen in el-Ḥenu and el-Ḥarajeh. Part of el-Ḥarajeh towers about 18 m. over the wadi from its perch on the ancient fields (Plate 1).

Another type of modern town gives every

⁴ *The Geography of Strabo*, translated by H. L. Jones (Loeb Classical Library, London, 1930), 16. 4. 22-24.

appearance of being built on what the archaeologist calls a "tell" (Plates 2, 3). A true tell is composed of many successive periods of habitation, and rises because of the accumulation of debris as one period builds on top of another. These towns were usually walled. However, I suspect that these modern "tell towns" may be very deceiving. It seems that most of these towns were built on ancient agricultural silt, originally either on flat areas or on relatively small buttes. If they were built on level areas, and the surrounding silt has now eroded away, they could be older than ones built later on buttes or on the remains of ancient towns. Such towns are illustrated by ed-Darb (Plate 2) and Nuqūb (Plate 3). While there is no ancient silt evident nearby, there are extensive remains of silt farther towards the mountain in both of these cases. Thus the archaeologist digging into either of these apparent tells might well find nothing but agricultural silt in the lower portion of the mounds.

In Beihān there are the ruins of numerous Qatabanian cities, foremost of which are Hajar Kohlān (Plate 4), Huṣn el-Hajar, and Hajar bin Humeid (Plate 5). Inscriptions collected in Beihān years ago indicated that the capital of ancient Qatabān was a city called Timna', a fact well known to classical geographers. When the Expedition reached Hajar Kohlān, the site of ancient Timna', inscriptions were visible on an obelisk, the South Gate, and on the local Sheriff's house, where two inscribed blocks were built into the walls (both upside down).

I surveyed the site of Timna' on a 1/2000 scale. The results of this survey are shown in Plate 6. Timna' was essentially oblong in shape and was a sizable city according to ancient standards: about 670 m. at its longest dimension by about 350 m. at its narrowest, with an area of about 52 acres. There was apparently a wall around the town, although the evidence uncovered near the South Gate indicates that in some places the wall may have consisted only of the outside walls of houses. The double lines at the edge of the plan of Timna' (Plate 6) indicate a mound running along the edge, giving strong indications of a wall. In some of these mounds, segments of narrow walls were actually found (as shown). The single line on the edge of the site indicates that the site drops off without any evidence of a mound to indicate a wall.

The site was highest in the southwest corner, with an elevation of 24 to 26 m. above the wadi bed to the southeast, and was lowest in the northeast corner with an elevation of about 18 m. above the wadi bed. It seems that Timna' may have been originally built on agricultural silt. A part of this silt is visible near the southeast corner at an elevation of about 16 m. above the wadi bed. Thus, as was pointed out in the case of the tell towns, Timna' undoubtedly does not extend as a tell down to wadi level.

There are apparently at least two other gate areas at Timna', one on the northwest corner and the other on the east. In both these areas there is a decrease in elevation that leaves well-defined walls on each side above the apparent gate areas. In the case of the northwest area, there is a wall running down the slope on the east which apparently connects with the actual gate at a lower level. Inside the walls of the gate the elevation rises rapidly to the average tell level. However, in the case of the east gate, the ground slopes up evenly from a line between the two walls to the base of a structure with recessed walls (a temple excavated during the 1951 season). There is only one small mound between the gate area and this structure.

During the 1950 season the Expedition cleared King Shahr Hilal's obelisk, which still projected a few feet above the surface, and an area near the north wall, being the site at which a bronze plaque, with its reference to the temple of Dhu-Samawi, was reported to have been found by local inhabitants while quarrying for building material. In 1950-51 the Expedition also dug at the South Gate of Timna'. The results of these excavations will be published later in the series.

About 150 m. southeast of Hajar Kohlān there is another structure with a recessed wall. This latter structure, which may have been a temple, is built only 2 m. above the field which was taken as a 0.0 datum. Perowne must have been writing from memory when he said this structure was 20 ft. above the wadi bed.⁵ There is a flat stone platform in front of this recessed wall and there is evidence that there were two enclosing walls extending southward from the recessed wall, which still stands to its original height of 5.1 m. above the floor. There is evidence of mud-brick walls about 20 to 30 m. to the north in the back

⁵S. Perowne, "Im'adiya and Beihan, Aden Protectorate," *Antiquity*, 13 (1939), pp. 133-37.

of the wall, indicating that at least part of the silt is not natural.

The location of both platform and wall only 2 m. above the wadi bed indicates that there was probably not much ancient silt in the area when the structure was built and this in turn indicates that the silt to the southeast of the site of Timna' probably did not extend much past its present location. There are remains of ancient silt south and west of Hajar Kohlān. Since the silt remnants on the south extend all the way to Nuqūb, it seems probable that a canal brought water from the mountains at an elevation high above the present wadi level. This is very possible, since there are some well-built irrigation works only a few hundred meters south of Hajar Kohlān.

There are no other ruins of ancient cities in Beīhān as large as Hajar Kohlān. Next in size come Huṣn el-Hajar and Hajar bin Humeid. Huṣn el-Hajar is a tell about 10 m. above the field silt on the west side of the Wadi Beīhān (Plate 36). There is a stone house on the south end which is built on the lower courses of an ancient Qatabanian house of the type of construction prevalent just before and after the beginning of the Christian era. The blocks were all relatively small and exhibited the wedged construction typical of this period. This tell had a surface area of about 3.2 acres.

Three and a half km. south of Huṣn el-Hajar was Hajar bin Humeid (Plate 5). This tell was slightly larger than the former with a surface area of about 4.0 acres. The top of this tell was about 23 m. above the level of the present Wadi Beīhān just to the west (Plate 7). A modern irrigation canal made to irrigate the area to the north had been cut at the base of the tell. There was a scarp along the whole west side, completely exposing a section 15 m. deep. In 1950-51 the Expedition dug here on the scarp edge in an effort to establish a pottery sequence which will be described in a subsequent volume. The area excavated is shown by the crosshatching on Plate 7.

At the close of the second season the lowest level of habitation was reached. The lowest level at which pottery was found was 7.5 m., and bed silt was immediately below. Various evidence found to the east of Hajar bin Humeid indicates that the field level apparently reached an elevation of about 14 m. (using the same 0.0 datum

set in the wadi bed) by the early centuries A.D., shortly before the general abandonment of the irrigation systems. Thus if the town were started on the field silt when it was about 7.5 m., it is evident that the irrigation must have been started long before. Since the excavators have provisionally dated the foundation of the city at about 1000 B.C.⁶ the earliest irrigation may well go back into the second millennium B.C.

A little over 1 km. northeast of Hajar bin Humeid is a low unnamed mound rising about 3 or 4 m. above the level of the ancient field area (Plate 36). The surface of the mound (with an area of about 1.8 acres) was littered with Himyaritic potsherds, some of them apparently dating from the last centuries B.C.

Further on to the northwest on the edge of the silt overlooking the wadi, just opposite Huṣn el-Hajar, were the ruins of what was apparently an Islamic Arab fort (Plate 36). The structure was originally circular (about 29 m. in diameter), its wall made of small, square, uncut stones and river cobbles (Plate 8). The wall was about 3 m. above the surrounding field level, and there were mud-brick walls standing another 2 m. (Plate 9). The top was covered with potsherds, most of which were very crude and handmade. There were no Himyaritic sherds to be found in this area. From the height of the mud-brick walls still standing it would seem that this ruin may even be early modern Arab.

The only other evidence of an ancient abandoned city in Beīhān is to the southeast of the modern village of el-Harajeh. (However, there may well be ancient cities under some of the modern tell towns mentioned above.) Here may be seen entire walls of houses buried under considerable masses of irrigation silt (Plates 10, 11). That most of the walls were standing indicates that they were probably abandoned as the silt covered them, or perhaps abandoned for safer houses in the hills. I could not tell whether there were just a few houses or a town, since only a few walls were exposed by erosion. The fact that there were traces of charcoal and potsherds considerably below the walls would seem to indicate that the agricultural silt rose at a higher rate than the town did, and thus the town had to be abandoned. The walls were apparently left standing, since there is an abundance of building

⁶ Oral communication.

rock weathered out of a mountain spur near by. There is a small modern town very near these ruins bearing the name Maryamah.

Occasionally the walls of a house were noted among the irrigation ruins scattered over the ancient field levels. Sometimes these were fairly extensive, but usually they were only small structures. Most of those examined were constructed in the late style of Himyaritic construction, probably dating from the last centuries B.C. to the early centuries A.D. These houses were apparently built at field level, and there is a possibility that some of these structures may be water-distributing systems.

There was one other tell in the Beihān area, located in the delta of the small Wadi Dhahabah to the west of Beihān. The tell, known as Hajar Dhahabah, was 3 to 4 m. above the surrounding ground and had a surface area of about 2.5 acres.

The archaeological evidence of ruined Himyaritic towns in Beihān does not seem to indicate that there were more people living in the Beihān area two thousand years ago than there are now. Sherif Husein, the present ruler of Beihān, claims that today there are 20,000 inhabitants in Beihān, but it would seem that his estimate is rather high. The figure does not, however, include the Bal Ḥārith tribe, which lives in the delta. There is no evidence that there were any towns north of Timna' in ancient times, and there is no ancient silt visible as far north as the present limit of Bal Ḥārith cultivation, which stretches some 12 km. north of Hajar Kohlān. The Bal Ḥārith have been able to carry on *seil* irrigation in the delta region because of the inefficient handling of the runoff in the valley to the south. In ancient times the *seil* probably only occasionally reached as far north as it does now, and then only when it broke out of the southern irrigation systems following a particularly heavy rain.

SPUR TOWNS

In Pleistocene times, when rainfall was plentiful in the Beihān Valley, erosion worked into the valley walls, widening the valley 2 to 3 miles in some places. All the rock in Beihān is appar-

ently metamorphic, so that as the softer gneisses and schists were eroded, the harder quartzite rocks were left as ridges and spurs which often projected into the main valley. Spurs that projected into the valley proper were worn down considerably lower than the mountain masses directly behind them, and often had relatively level or dome-shaped tops only a few hundred meters above the valley. At other times the harder rock was left as rock outcrops in the valley proper. On top of these spurs and outcrops, several hundred meters above the valley floor, a variety of ruins was found. Some were simply Himyaritic graves, while others were apparently houses of an undetermined period, some perhaps Himyaritic.

The house ruins on these spurs were in many instances of sufficient number to warrant calling the site a small village. Where the ruins were obviously houses (as shown by doors and sometimes windows) there was a general similarity in construction. The walls were constructed of relatively flat stones often wedged with small rock fragments (Plates 12, 13). Sometimes a wall enclosed the ruined houses, running along the edge of the flat area on top of the spur or the outcrop (Plate 14).

Ruins of houses were found on a spur southeast of el-Harajeh (Plates 12, 13), on the spur of Taraf el-Aqeir (Plate 14), on a spur northeast of Jebel Khuḍreh, on the spur of Jebel Khalbas, on a spur east of Ḥeid el-Qarnein, on the outcrop of Jebel Khuḍreh, and on the two outcrops near Nuqūb. On the spur near el-Harajeh some walls are standing to a very considerable height (Plate 12). There are also ruins of houses on Jebel Reidān, but these differ from all the above mentioned (which are only several hundred meters from the valley floor) by being so near the top of the mountain (Plate 18).

CISTERNS AND TANKS

In practically every instance there were shallow plastered cisterns about the size of large bath tubs associated with the ruined spur villages, usually outside the house area (Plate 15). The

cisterns were not situated so that they would necessarily catch rain water, and since they were on top of the spurs, the runoff could not very well have been directed into them as in the case of some other cisterns. Therefore the plaster-lined cisterns were probably filled with water carried up from below. Such cisterns were seen on spurs at el-Ḥarajeh, Jebel Khudreh, Jebel Khalbas, and Nuqûb.

There is one set of cisterns in Beihân similar to the Aden "tanks" in principle and construction. The Aden tanks consist of nothing more than dams constructed across deep ravines for the storage of water. However, the important technique of construction in the Aden tanks was the methodical plastering of the inside of the ravine. Not only was the inside of the cistern face lined with plaster up to the top of the possible water level, but every crack in the natural rock drainage system was plugged with plaster so as to increase the efficiency of the water collection. (While some of the tanks at Aden have been repaired recently, nothing has been done towards sealing the natural runoff system against leaks.) At Ḥuṣn el-Ghurâb, the probable site of Cana [Qana] of *The Periplus of the Erythraean Sea*, there are four tanks near the ruins of buildings on top of an extinct volcanic crater. Wellsted states that they were excavated with much labor out of the solid rock.⁷ The cisterns are apparently built to collect the runoff from the whole surface of the crater. Freya Stark shows a photograph of one of the Qana tanks which appears to be identical with some of the tanks at Aden that were not rebuilt by the British in the last century.⁸ The Qana tanks are constructed of roughly cut blocks of the same size, laid in courses and originally plastered inside. It would seem that both the Aden and Ḥuṣn el-Ghurâb tanks were probably built sometime before the start of the Christian era, although some authorities have argued for a Persian origin of the Aden tanks.

In Beihân a system identical with some of the Aden tanks is located near the top of Jebel Reidân (Plates 16, 17). While the Beihân system on Reidân does not compare in capacity

with the large Aden tanks, which run to millions of gallons, the Reidân tanks do compare with some of the smaller Aden tanks, which are calculated in thousands of gallons of storage. The Reidân tanks are very similar to those at Aden in a number of instances. In the first place the basic construction is identical. The dam is constructed of a thick wall made of relatively flat stones with mud as a mortar (Plate 16). Rather than one large dam, there are several dams at different elevations with overflows, so that when one tank was filled it overflowed into the next one below. The reason for this is simple: there is a limit to the height of a dam of small stones and mud. The Reidân system was also similar to the Aden tanks in plastering the fissures leading into the runoff system above the dams, and in having a high percentage of gravel mixed with the plaster.

The Reidân system differed from the Aden systems in not having the outside faces of the dams plastered. The Reidân tanks were periodically replastered, since there are 5 to 7 layers of plaster visible on the inside faces of some of the cisterns (Plate 17). To the south and below the Reidân tanks were the ruins of a small village consisting of a dozen or so houses, whose walls were standing to a height of 2 to 3 m. (Plate 19). Near these ruins were some of the shallow tubelike cisterns.

TOMBS AND CEMETERIES

There are some ruins on the low valley spurs that at first sight appeared to be houses, but on closer examination were found to be tombs (Plates 20, 21). These tombs were constructed with heavy outer walls and smaller dividing walls within, usually with a central corridor. Such structures were found on Jebel Khudreh, on two blunt spurs east of Hajâr bin Humeid, and on a spur near Wadi Warikheh. Clusters of such tombs were also found in other areas, usually on the lower slopes of the mountains. Tombs of this general type were common in Himyaritic Beihân.

At Hajâr bin Humeid I discovered on a silt

⁷ J. R. Wellsted, *Travels in Arabia* (London, 1838), II, pp. 421-26.

⁸ F. Stark, "An Exploration in the Hadhramaut and Journey to the Coast," *Geographical Journal*, 93 (1939), plate facing p. 6.

plateau (deposited as a result of ancient irrigation) a rectangular stone structure that first looked like the foundation of a house, but later proved to be a tomb. Erosion had cut into one end, exposing several chambers which contained broken bones and pottery. A single course of large blocks projected above the silt, and the whole surface of the rectangle was covered with stones 10 to 20 cm. in diameter (Plates 20, 21). The interesting thing about these stones was that the exposed part was covered with the dark patina of "desert varnish," while the part of the stones resting on the ground was light colored. Now, in numerous places in Beihān graffiti had been pecked on hard rock faces. Some of these could be dated, the possible range varying from about 1000 n. c. to 100 n. c. In even the earliest graffiti the lettered parts had not become as dark as the original rock, showing that it takes over 3000 years to duplicate the original darkening. The fact that the exposed parts of the stones covering the tomb were darkened considerably, while the underneath was not, demonstrates two things: the stones on top of the tomb had not been disturbed for probably well over a thousand years; and they probably came from a quarry, since originally all the faces must have been freshly fractured.

The tomb contained 16 chambers (Plate 22). The outside wall was composed of a lower wall of small stones with a capping of much larger rough-cut blocks. There were ledges about a meter above the foundations projecting from the dividing walls several centimeters into each chamber. Resting on some of these there were thin (5 to 10 cm.) slabs; on others there was nothing. Eight chambers were excavated: T1, T2, T3, T4, T9, T10, T11, and T12. Everything found had been broken into small pieces ranging in size from 2 to 10 cm. In instances where there were slabs on the ledges, there was usually nothing but hard-packed sandy clay under the slabs. Where there were no slabs, broken bones and potsherds often extended down 25 to 40 cm. below where the slabs would have been. The central corridor was also littered with broken bones and sherds. These were not at any one particular level, but were mixed with sand and silt over a depth of from 60 to 90 cm. Among the hundreds of sherds and broken bones, there were a few small fragments of ostrich shells and a few cowry-shell beads. About 15 fragments

of soapstone vessels were found. A small stone with a Himyaritic inscription, which has been provisionally dated in about the second century b. c. by A. Jamme, was found in the corridor between T4 and T12 in the top stratum. Pottery was found in the tomb similar to that found at the cemetery of Timna', part of which was also dated in the second century b. c.

From the data observed, a certain amount of reconstruction is possible. Sections made at various points showed that in many instances there was a definite stratification. In some instances the strata were in the lense-shaped layers that would result if the fill were partially trampled down. The corridor showed more uniform layering than did the chambers. It would seem that the tomb must have been used over a considerable length of time, and that with each re-use broken bones and vessels were scattered around inside and then covered with dirt. The shape and nature of the layers in the corridor indicated that they may have been natural and caused by blown sand.

Very few of the potsherds from the chambers fitted together. When any pieces did fit together, there were never enough pieces to make whole vessels or even a large section of one. Fragments of steatite vases from T3 and T4 fitted together, as did steatite fragments from T1, T3, and T12, and some of the pottery from different chambers. This would seem to indicate either that the vessel fragments were not placed in any particular chamber or that they were scattered around by subsequent plundering. The bones were broken into such small pieces that it was impossible to tell how many individuals were found altogether, but in a few instances it appeared that there was more than one body in a chamber. Since bones and potsherds were found almost directly under the covering of the rocks, it would seem that the tomb was used up to the time the final covering of earth and rocks was made.

Examination of Sections A-A and B-B in Plate 22 indicates some most interesting points. There are several courses of large blocks resting on a wall made of much smaller stones of about eight courses. The top of this smaller wall corresponds almost exactly with the top of the narrow ledges left projecting inside of each chamber. The fact that the courses of large blocks overhang the wall of smaller stones on the outside would seem

to indicate that the latter was essentially a foundation. When there were slabs resting on the ledges in the chambers, there was nothing but hard-packed clay underneath, suggesting that the slabs were originally meant to be the floors of each chamber. The fact that bones and pottery were usually found below the slab level in chambers where there were no slabs, probably indicates that later excavation extended the use of the tomb. The covering of stones, with desert varnish on their upper surfaces only, would seem to exclude the possibility that grave robbers removed the slabs.

A test trench which I ran at right angles to the outside of the tomb uncovered an external burial containing a number of broken bones, a small glass vase, two small copper dishes, and a copper point. None of these articles had been broken. The bones were broken, but they were in much larger pieces than those found inside the tomb, where it was rare to find a piece of bone longer than 10 cm. This burial may have been contracted to fit in the small elongated hole.

North of Hajar Kohlān (Timna') there is a large rock outcrop known as Ḥeid bin 'Aqīl. On the southwest side was the cemetery for Timna' at the base of the rocky hill and on the scree-slope. This is the only cemetery discovered in Beihān. Many tombs were excavated during the first season in 1950 and many more were cleared during the second campaign in 1951. Each had a central corridor with from 2 to 4 chambers opening off either one or both sides. Each of these chambers was from 2 to 3 tiers high, each level being separated from the compartment below by flat slabs built into the walls. While many human bones were found, there were never complete skeletons. Many bones had been burned. In almost every case the objects had been broken. Much of the material was found outside the chambers in the central corridor. It seems that the tombs were simply ossuaries and that the central passages probably served some function in religious rites connected with the deceased. The Ḥeid bin 'Aqīl tombs are thus similar to the Hajar bin Ḥumeid tomb in general plan, although they had fewer chambers and a number of tiers. Neither the bones nor the grave articles at Ḥeid bin 'Aqīl were broken into pieces as small as those in the single tomb excavated at Hajar bin Ḥumeid.

Where a spur had an irregular top that pro-

hibited the construction of houses or large tombs there was often a square tomb on the highest point (Plates 23, 24). These tombs were about 2.5 to 3 m. square and 2.5 to 3 m. high with a meter-square chamber inside. They were apparently originally filled and covered with stones on top. Most of those I saw had been broken into by recent grave robbers, who comb Beihān with lamentable thoroughness. I observed less than a dozen examples of this particular type of tomb: on Taraf el-'Aqeir (Plate 24), on the spur just south from Taraf el-'Aqeir (Plate 23), and on a rocky mountain point overlooking an ancient wall near the entrance to Mablaqah pass.

There are also a few small cairns scattered around on these low spurs, usually in groups of twos and threes, but I did not see over a dozen in Beihān. They were usually not over 2 m. in diameter and not over 1 m. high. Some had apparently been dismantled for the stone, exposing circular central cists made of flat stones set on edge. There was one large cairn on Taraf el-'Aqeir about 3 m. high and 10 m. in diameter. Someone had broken into it, removing the stones on one side and exposing walls, Himyaritic potsherds, and plaster fragments. This was the only large cairn I observed in Beihān. Mr. Nigel Groom has told me that he saw cairns on a ridge up Wadi Ghābar el-A'la that were identical with the pillbox tombs found by Philby south of Nejrān. Cairns seem to be the exception rather than the rule in Beihān. For a summary of other cairns and tombs reported from South Arabia, see Appendix I.

QUARRIES, SPRINGS, PATHS, AND WALLS

There were numerous ancient quarries found on the spurs jutting into the valley (Plate 25). These were usually found in places where a layer of hard rock was exposed at the surface. The Qatabanians found that the hard rock of these spurs with its age-old patina was an ideal place for graffiti and inscriptions, because when the patina was removed, the rock underneath was a much lighter color. After centuries the light colored letters have darkened, and the relative

ages of groups of graffiti at the same locale can often be told by the degree of darkening of the patina on the lighter rock exposed by the lettering. It is interesting to note that it takes over 3000 years to completely darken the rocks, since not even the oldest graffiti are quite as dark as the natural rock.

At various points throughout Beihān there are graffiti on these harder rocks that have no apparent meaning. Many of these include a multiplicity of the following signs: δ, Ω, Σ. Philby has offered an explanation for many of these signs found in the desert area between the Ramlet Sabatein and the Rub' el-Khāli.⁹ Philby says that δ and Ω are the Himyaritic water-signs, and that the loop is indifferently engraved upwards or downwards. According to him this sign indicates a bucket with a length of rope attached. At a water-hole in Wadi 'Araija, Philby saw the Himyaritic water-sign δ or Ω engraved on the cliff above the water-hole with 12 dots indicating the number of double paces from the cliff to the hole. At Moshainiqah Philby again found a large water-sign with 28 dots to show the distance to the well. There was also a representation of a man pointing his finger towards the well. The illustration Philby reproduces shows in addition to the man, the signs δ, Ω, Σ. Philby makes no comment on the Σ.

In many places in Beihān these same three signs are found, but usually Σ predominates. In two places they almost cover the faces of two large boulders. These two locations are about a kilometer from the entrance to Wadi Fara', one on each side of the entrance. In Wadi Fara' is found the only spring in Beihān. In addition to the spring, the rains feed several large pools of water (Plates 26, 27). The walls of Wadi Fara' are covered with hundreds of graffiti and inscriptions, showing that ancient shepherds came to this valley as often as do the modern ones. Thus in Beihān the signs δ, Ω, Σ would generally seem to signify water.

Occasionally ancient paths and long walls are seen in Beihān. Just north of Jebel Khuḍreh there is a yard-wide paved path running up to a quarry on the hillside. On the north side of the Taraf el-Aqeir spur there is a long gentle yard-wide paved path running up from the ground level to some houses near the top of the spur

(Plate 28). This last path may have also led over the spur through a low pass, but there is no evidence of this now. There are fragments of other paved paths in other localities.

There are three long walls preserved in Beihān, two apparently being fortifications, the other undoubtedly belonging to an irrigation system and serving as an "inclined collector" for rain water. This last one is northeast of Jebel Khuḍreh near She'b edh-Dhaqab. It starts out on level ground and runs part of the way up the spur towards the house ruins and cistern there. It is not over a meter high and about as wide. This low stone wall collected the runoff water from the whole area above the wall and delivered it to one point at the foot of the wall.

The other two walls run across a corridor that passes between the mountain mass and some isolated outcrops in the Beihān valley proper. This passage offers an alternate route for reaching the Mablaqah pass from the desert. I did not have an opportunity to examine the wall at the desert end of the corridor. Its location was given to me by F. Heybroek, geologist of the Expedition. The wall ran between the western mountain mass and a small outcrop in the middle. These walls are shown on the Heybroek-Groom map (Frontispiece).

The southern wall nearer Mablaqah runs completely across the valley floor, which slopes downward to the east. The east end runs up the mountain to an almost vertical face of rock. The wall at the top of the east end was about 1.9 m. thick, and was built in steps about 1.7 m. long. The highest part of the step was about 1.5 m. and the lowest part was 75 cm. At the bottom of the mountain the wall narrowed to about 1.5 m. There was a bottom course of large boulders, but there were no other courses in the wall on the mountain. Once the wall reached the valley floor, it had only one face. The wall was from 1.2 to 1.4 m. high with a slight batter. Gravel and rocks were apparently piled in back of the wall to an average thickness of about a meter. The wall had no foundation, but was laid on the rocky valley floor, as could be seen in several places that had washed out. There were 6 to 7 courses 15 to 20 cm. high, mostly of small river boulders, although there were a few quarried blocks. The wall apparently ran all the way to the mountain on the west end also, but over 300 m. of the last stretch have been washed out

⁹ H. St. J. B. Philby, *Sheba's Daughters* (London, 1939), pp. 42, 44, 55.

by the action of a small wadi that starts just to the south of the place where the wall would meet the west edge of the mountain.

There were the foundations of some houses or graves on a spur at the west end of the wall. Above the east end on a rocky crag was the square tomb mentioned above. The wall was not straight between the two mountain edges, but took a slightly sinuous course. It had a very peculiar pattern: every 25 to 30 m. its course was displaced laterally from 25 cm. to 1.7 m., sometimes successively in the same direction, and other times alternately in and out.

MABLAQAH PASS

Wadi Mablaqah leads from Beihān up to a high pass crossing over into Wadi Ḥarib. This is the only pass connecting the two valleys across the mountains. The only other means of communication is at the desert end of the valleys. The height of the Mablaqah pass was lowered by the ancient Qatabanians, who made a deep cut through the rock and built a paved road over the highest part of the pass. There are two dedicatory inscriptions on the rock walls at the top of the pass.

NAJD MARQAD

There is one other pass that should be mentioned. While it is outside the Beihān area, in ancient times it was undoubtedly in Qatabān. The pass is known as Najd Marqad and is only five miles from the bed of Wadi Ḥarib. Actually the structure does not warrant being called a pass, since the maximum rise above the relatively level ground at each end is only about 20 m. (Plate 29). Najd Marqad is simply a roadway with walls on both sides. Although one has the feeling that the ends of the roadway are funnel-shaped, they actually are not (Plate 32), but

appear this way only because at each end the walls are low and rise in height towards the middle. As the grade increases, the walls become higher and hence tend to seem closer together. The walls are virtually parallel in the center section, varying from 9.8 to 10.6 m. apart, and they flare out to 18 to 22 m. at the ends.

Najd Marqad was originally paved. Two small sections of paving still in place show that the paving was composed of irregular blocks, which were often deeper than their greatest width. Erosion has removed most of the paving and cut gullies as much as a meter deep in places (Plate 30). The two walls are about a meter thick throughout their whole length, and have a slight batter in some places. The blocks in the wall are of square rather than wedge construction, and are laid in courses at the east end. The wall rises in height as it goes up the slope by simply adding a course. At the west approach the courses are less evident than on the east. At the west end the wall has a vertical face, but, at the east flanks, each course is set back a little, giving a slight batter. The top of the middle of the north side is now in ruins, as are other small sections. The walls do not run straight when one sights along them, but this is apparently because they follow the course of the two small wadies starting at the top and going down each side.

On the south side of the east approach a ramp slants down from the roadway (Plate 29). There is an exit similarly placed at the west end, but it is so badly disintegrated that one cannot tell whether it was a ramp or a stairway. In the middle of the roadway at the top of the south side there is a broad stairway with a structure which may have been an altar built into one side (Plate 31).

There is little doubt that this roadway served as a taxation point for the east-west movement of camel caravans in and out of Ḥarib. While the roadway would not necessarily act as a funnel to herd a caravan through the pass, it would serve as a device to keep a caravan in line once it started. While the walls at both ends may be low enough for a camel to climb over, those at the middle certainly are too high for a camel. Thus a camel could not get through the pass without passing through the center.

It would seem that there could be two possible purposes for such a roadway:

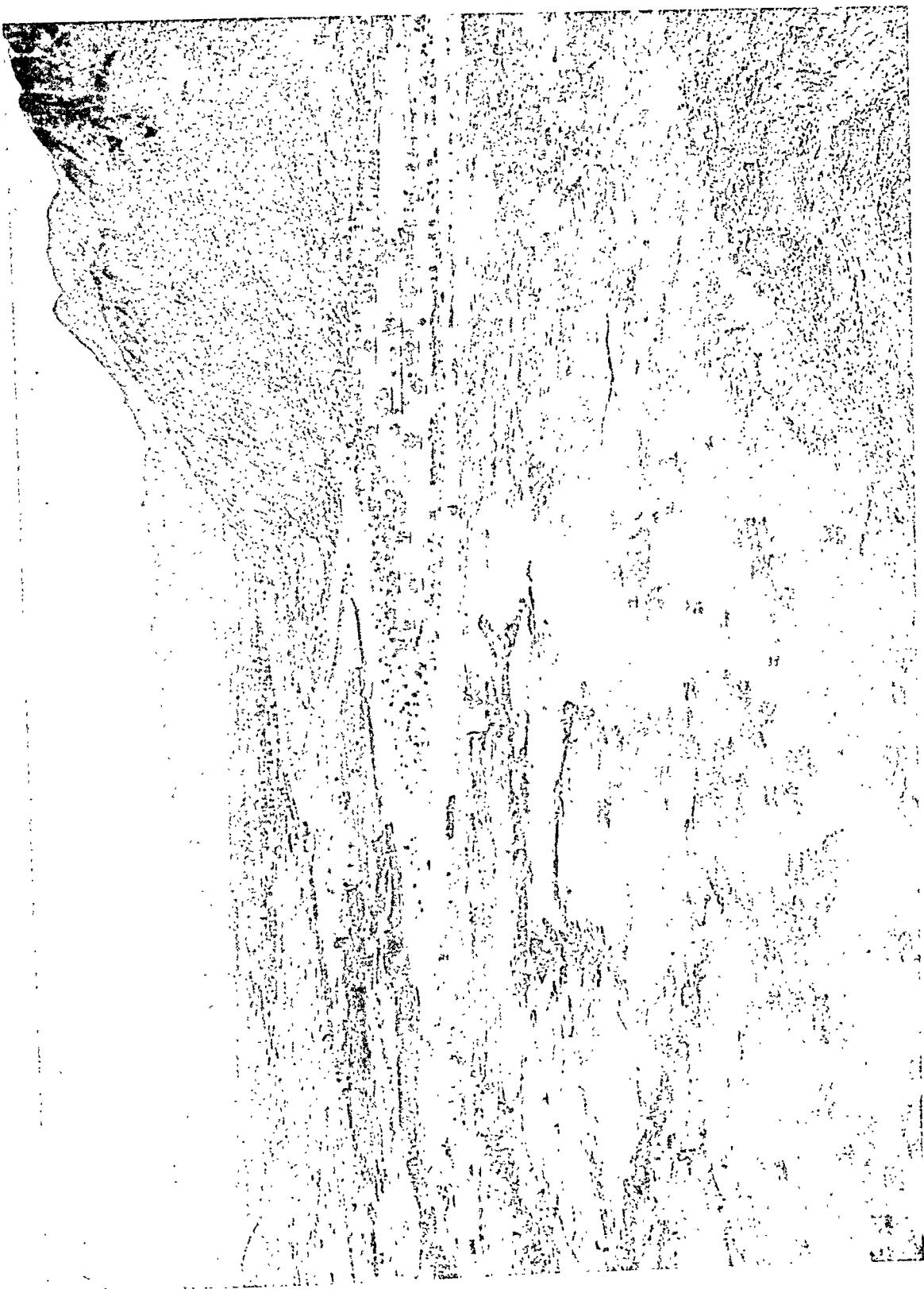
1. Caravans coming in from the desert or leaving Ḥarīb would enter the roadway via the wide entrance, would be counted at the center (and perhaps be examined), and then would pass out over the ramps and collect in the areas to the south to wait until the tax was paid and the caravan had permission to move.

2. The second procedure would be just the reverse of the first. Caravans would collect in an area to the south of the wall and then would enter via the ramp, would be checked, and would pass out through the main entrance. This might seem to be the more logical procedure, since the caravan would have to collect and receive permission to enter the ramp. The fact that both small exits at each end were on the south seems to indicate that only one-way traffic was allowed.

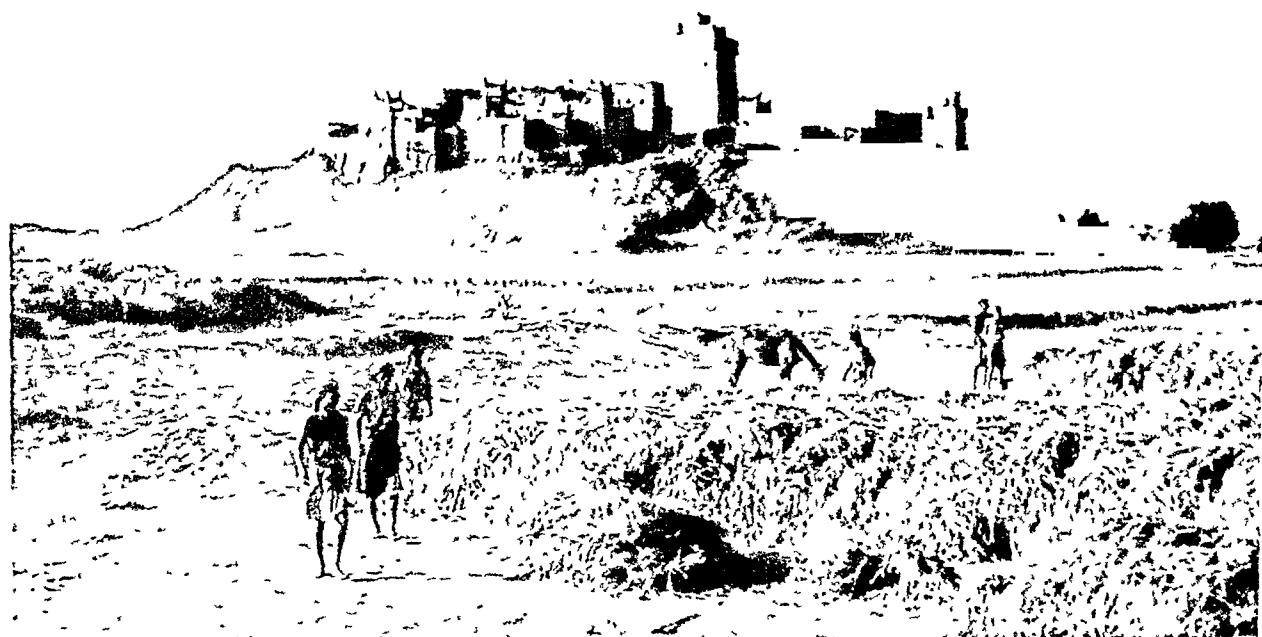
That the route is still well used is shown by as many as ten parallel camel tracks worn into the plain to the east of Najd Marqad. It is interesting to note that as soon as the ground becomes rocky the route narrows to about two tracks, and when it gets very rocky, it narrows to one. As the present route from Beihân to Mârib branches off to the north about half-way between Beihân

and Ḥarīb, there is no reason to believe that Najd Marqad served more than the east-west traffic in and out of Ḥarīb. This would include caravans from and to Shabwa as well as Beihân. Caravans bound from ancient Ḥarīb to the southern part of Beihân probably used the Mablaqah pass. Reports seem to indicate that many of the ruins in Ḥarīb are located opposite the Mablaqah pass. Thus for Ḥarīb caravans going to any point in Beihân near or south of the Mablaqah pass, the shortest route was through the Mablaqah pass. This might even have applied to caravans bound from Ḥarīb to Timna', the route being more protected.

It is difficult to see how the wall (mentioned above) across the corridor leading from the desert into Beihân could have been built for the control of caravans. It would make no difference whether a caravan went through the corridor or not, for it would have to pass through the narrow Mablaqah pass in any case. It would seem that the wall was actually a fortification to prevent raiders from entering Beihân by an uninhabited route, for there were never any towns near the wall.



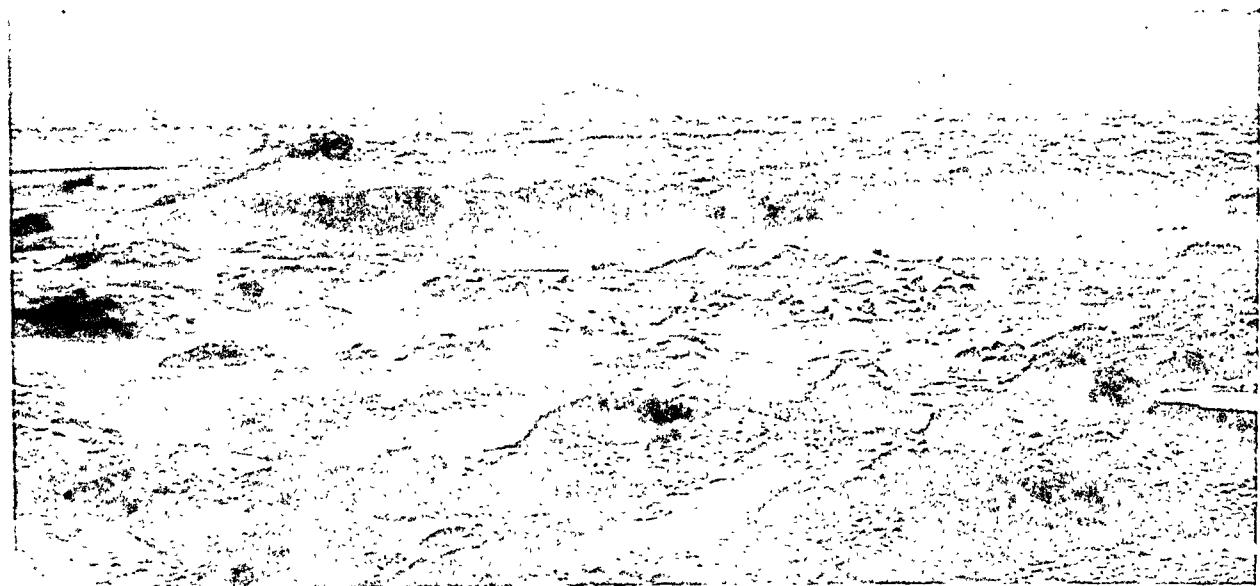
I. View of el-Harajeh silt on Wadi Nahr looking north. The town of el-Harajeh can be seen on the silt to the left of the photograph. Beihān elQasāb is in the background. Note ruins of houses in lower right on low spur.



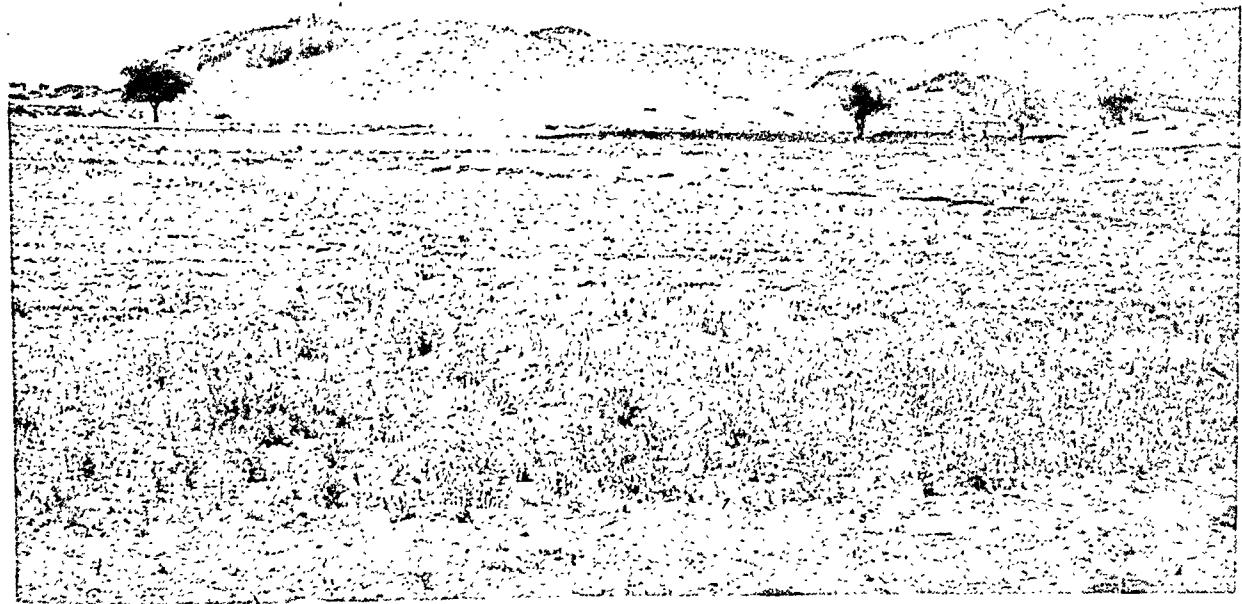
2. Modern "tell town" of ed-Darb north of Nuqûb at harvest time.



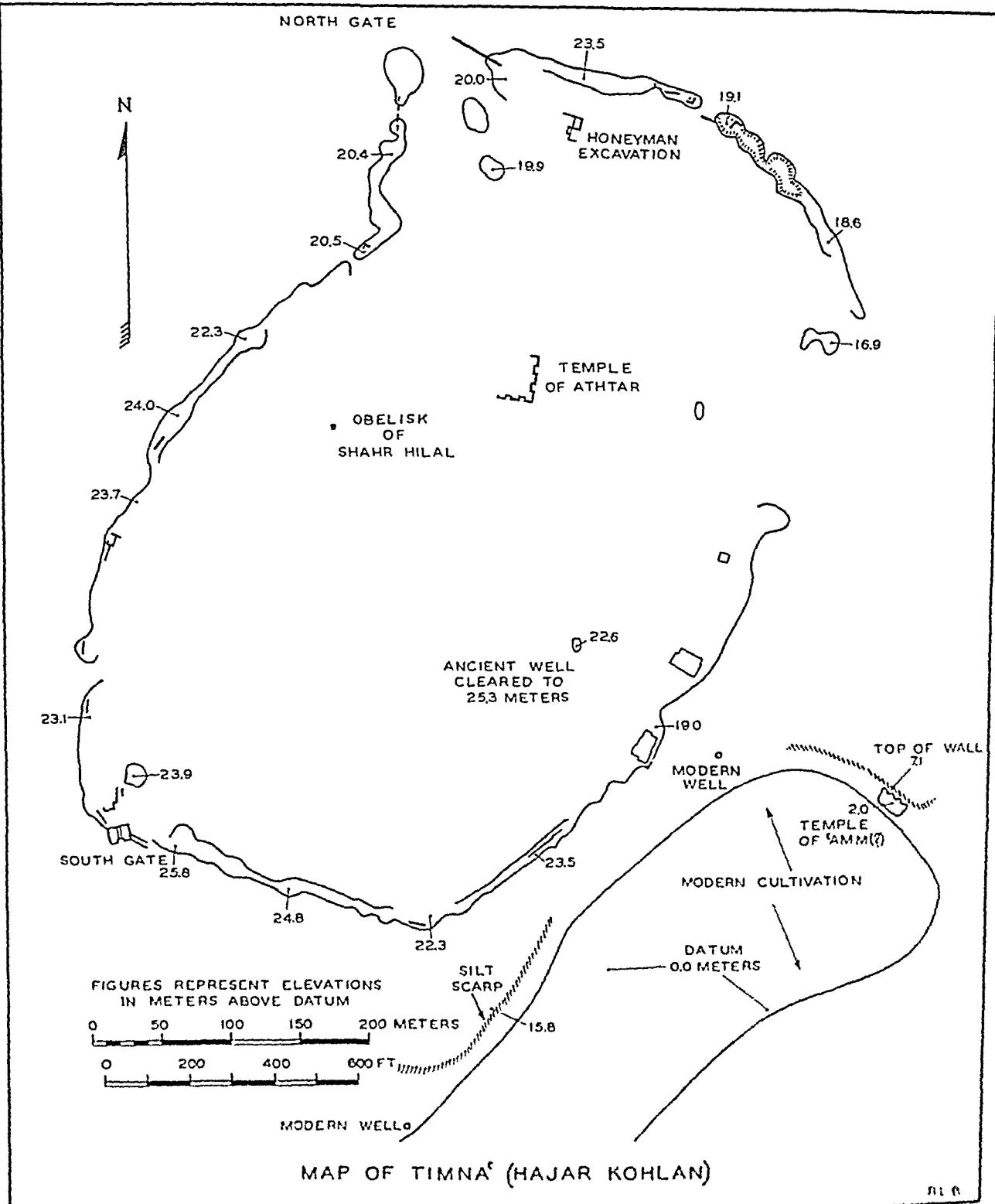
3. Modern "tell town" of Nuqûb on the edge of Wadi Beihân.



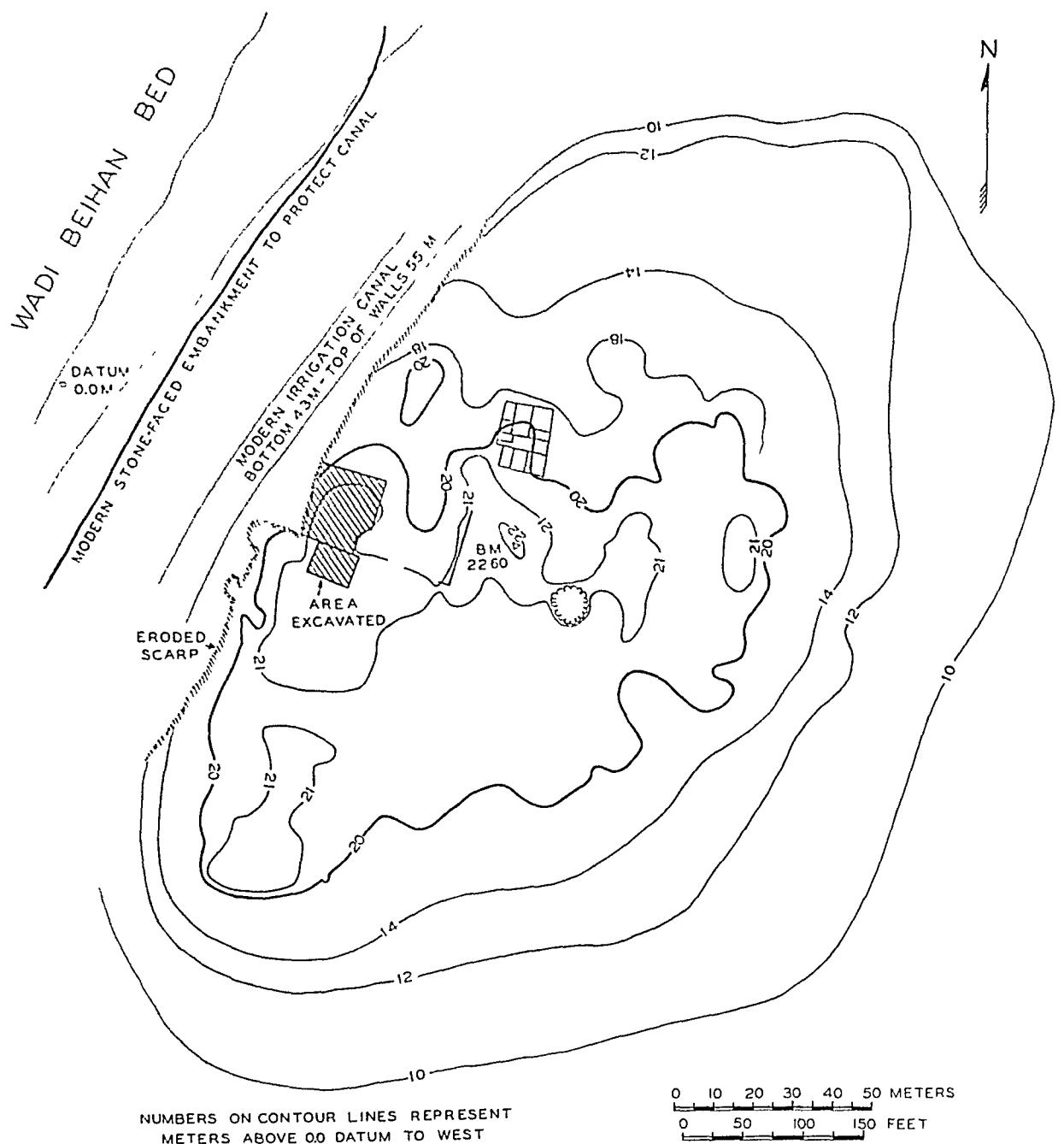
4. Ruins of Timna' at Hajar Kohlān as seen from the north. The tell is the mound stretching across the center of the photograph.



5. The mound at Hajar bin Ḥumeid as seen from the south. A few 'elb trees are in front of the tell.



6. Plan of the ancient city of Timna^E (Hajar Kohlan), showing the principal ruins visible before excavation. Major excavations have been carried out at the South Gate and at the Temple of 'Attar.



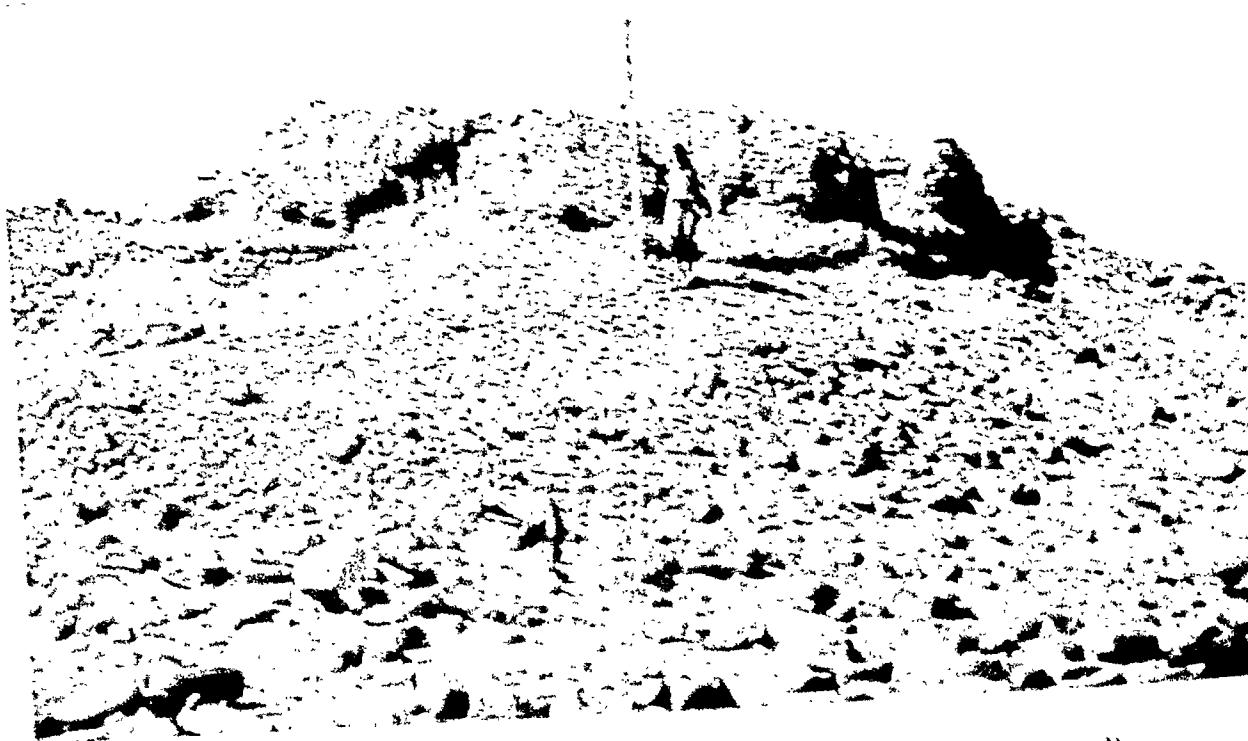
MAP OF HAJAR BIN HUMEID

RLB

7. Contour map of Hajar bin Humeid showing the area excavated. The datum of 0.0 m. and the bench mark of 22.60 m. are also indicated.



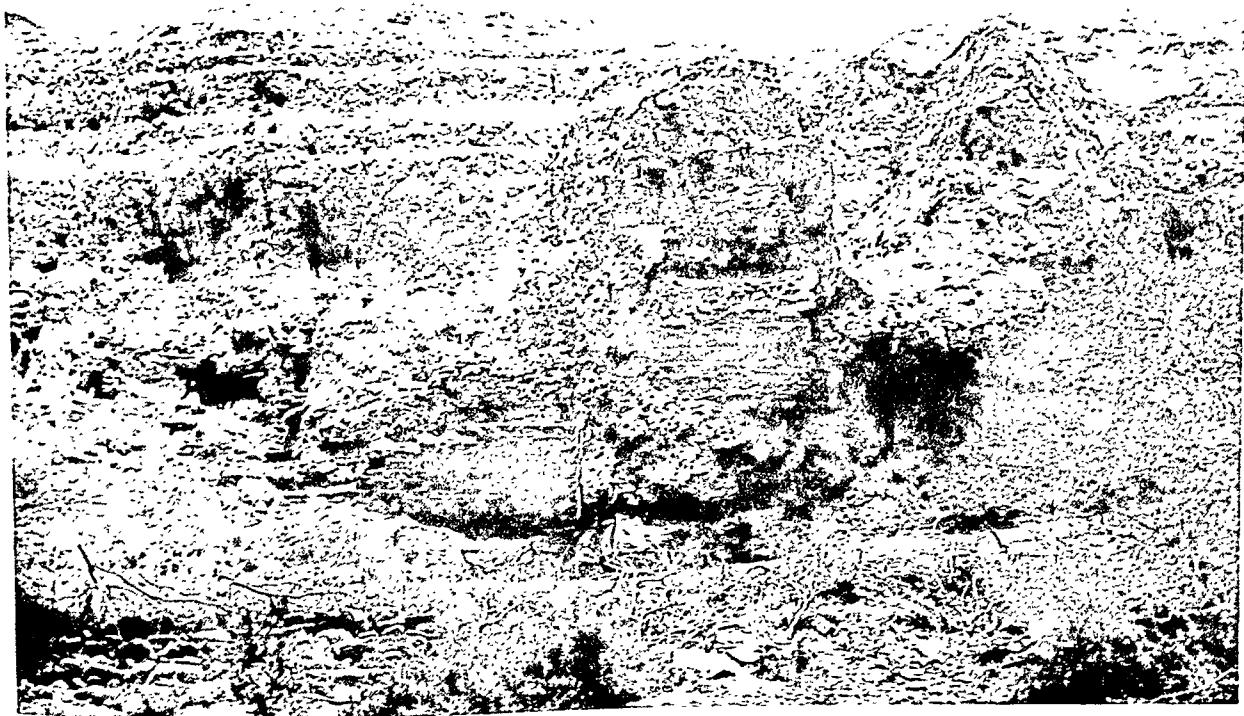
8. Circular ruin of medieval Arab fort (?) looking east.



9. Circular ruin of Arab fort (?) looking north. Note the mudbrick walls standing to a height of 2m.



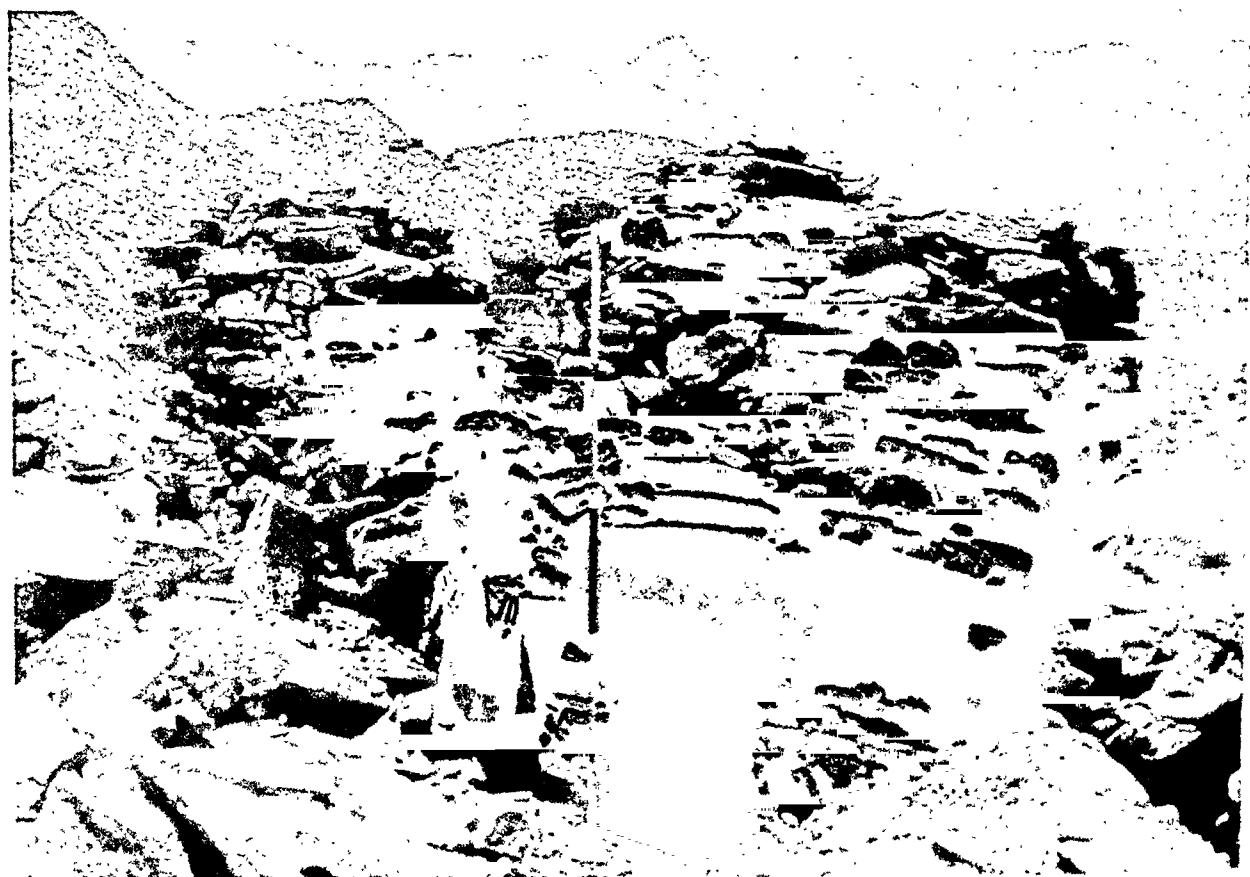
10. Ruins of houses buried under agricultural silt at el-Harajeh.



11. Ruins of houses buried under agricultural silt at el-Harajeh.



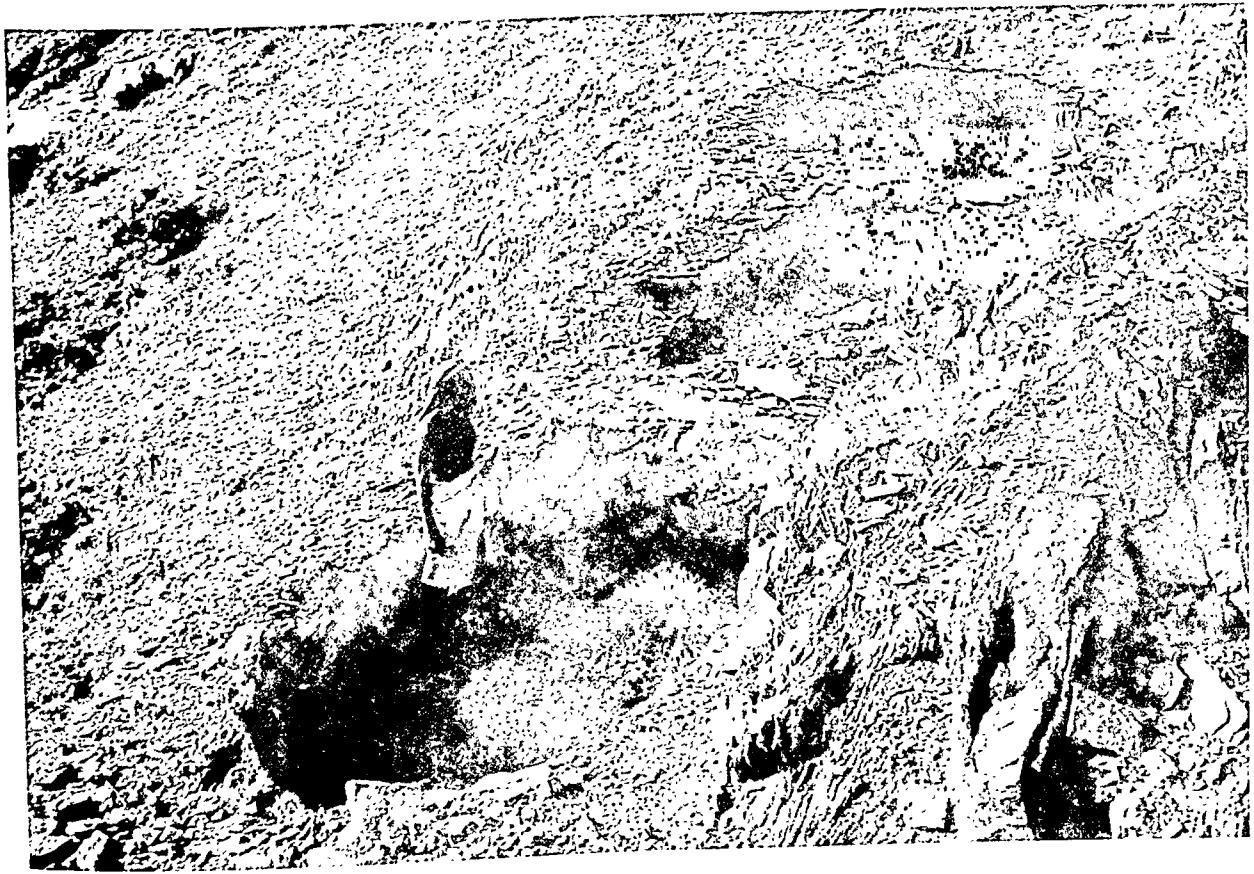
12. Ruins of the massive wall of a house built on a low spur 100 m. or so above the valley floor. The el-Harajeh silt is seen in the background.



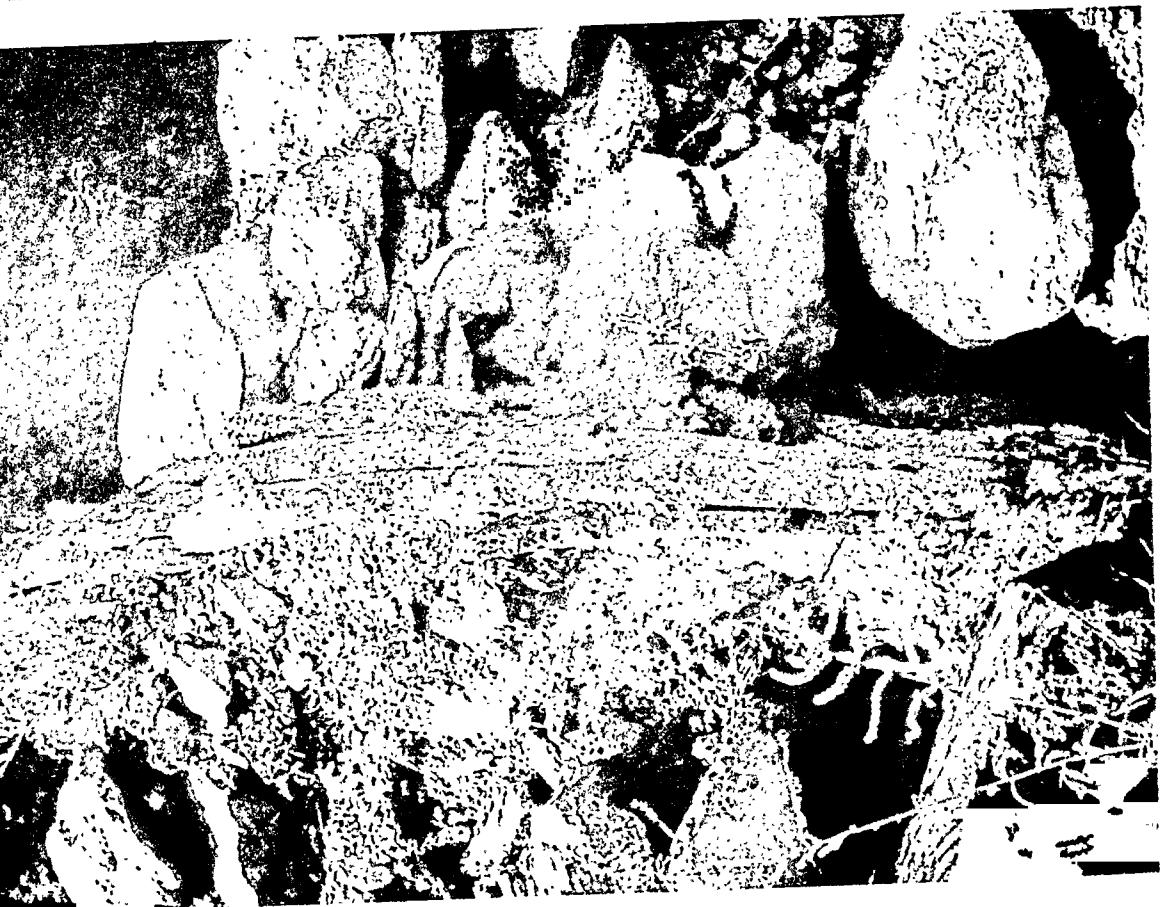
13. Ruins of a house on the spur above the el-Harajeh silt showing a door in the massive wall. The entrance was probably higher, as debris appears to have fallen in front of the door.



14. Part of a wall (center) which surrounded a level area at the top of a low spur at Taraf el-Aqeir. There were ruins of some houses within the wall, and some cairns outside the wall.



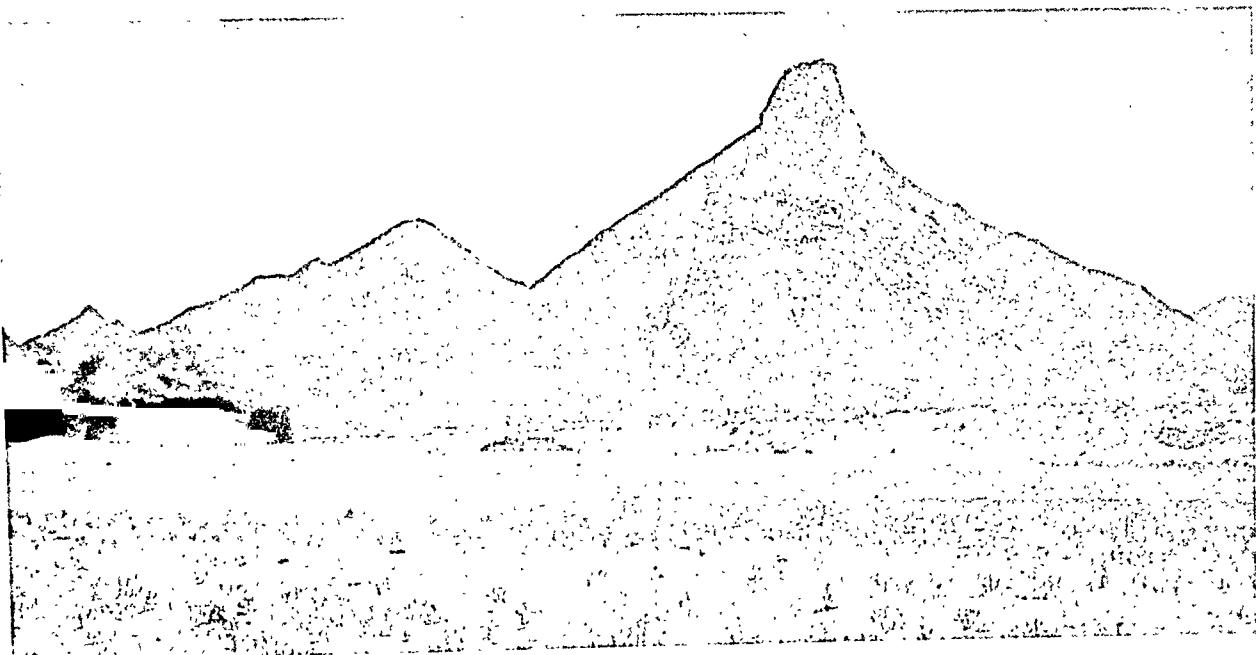
15. Three cisterns with plastered interiors near the ruins of some houses on a low spur several hundred meters above the valley north of Jebel Khudreh.



17. Successive layers of plaster on the inside face of one of the dams on Jebel Reidan. The rock and mud wall of the dam is to the right; the debris of rocks and mud to the left is from silting of the space behind the dam.



16. One of many dams for water storage on Jebel Reidan. Note that the space behind the dam is completely silted up. In normal operation this debris would have to be periodically removed to maintain storage capacity.



18. Jebel Reidān as seen from the northeast. The mountain looms over the central portion of Wadi Beihān like a great pyramid. Ancient dams for storing water are found high on its rocky slopes.



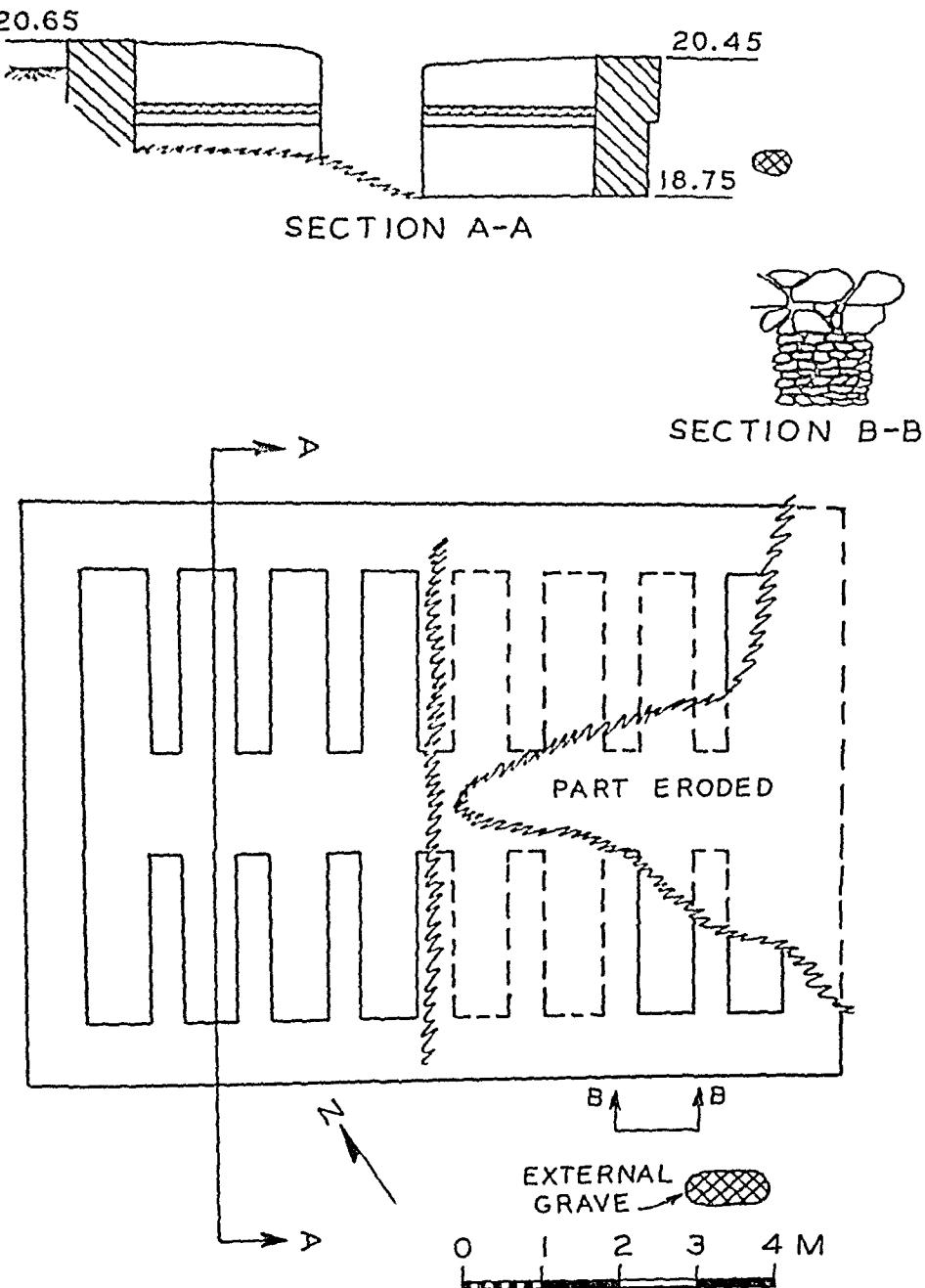
19. Group of ruined houses standing at the edge of a cliff high on the slopes of Jebel Reidān. Slightly above these houses are to be found the ruins of numerous dams.



20. Hajar bin Ḥumeid tomb as discovered. One of the walls of the tomb can be seen to the right. The covering of stone had not been touched for centuries since the tops of the small rocks were darkened by desert varnish, but the bottoms were the pale color of the freshly broken rock.



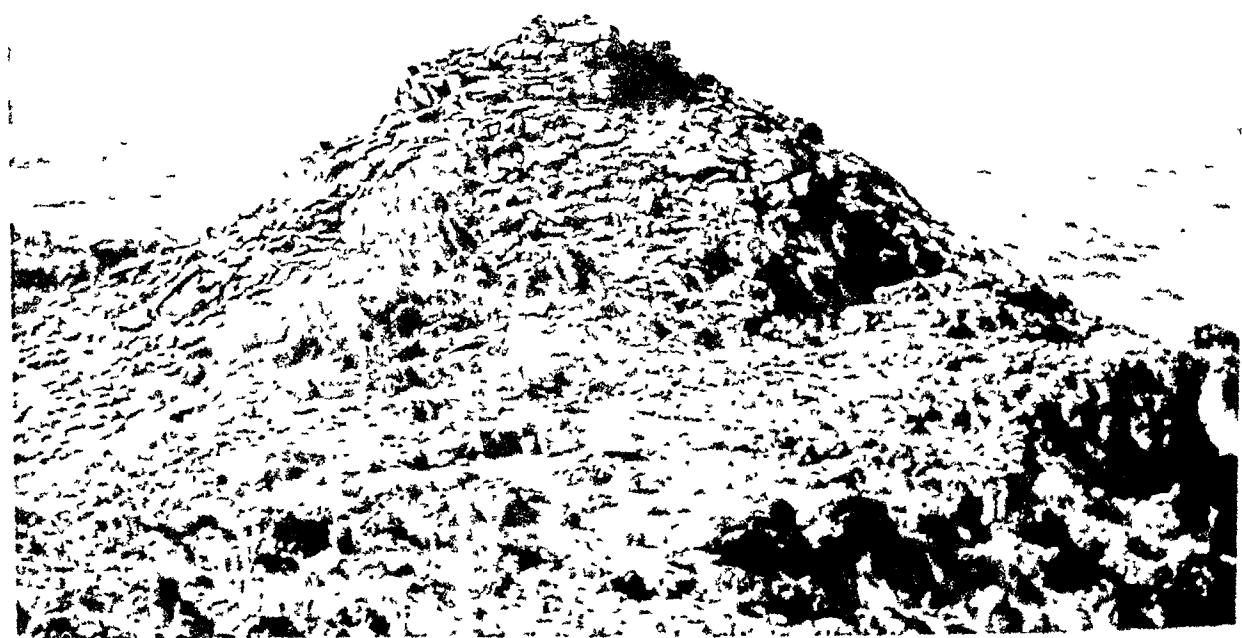
21. Hajar bin Ḥumeid tomb after excavating some of the 16 chambers. Only broken bones and broken pottery were found in the chambers and the central passage.



22. Plan of the Hajar bin Humeid tomb. The elevations are in meters above Wadi Beiḥān bed at Hajar bin Humeid, the datum for the area.



23. Tomb of cubical shape about 3 meters on a side, built on a rocky spur about a hundred meters above the valley at Taraf el-Aqeir.



24. Similar tomb on Taraf el'Aqeir



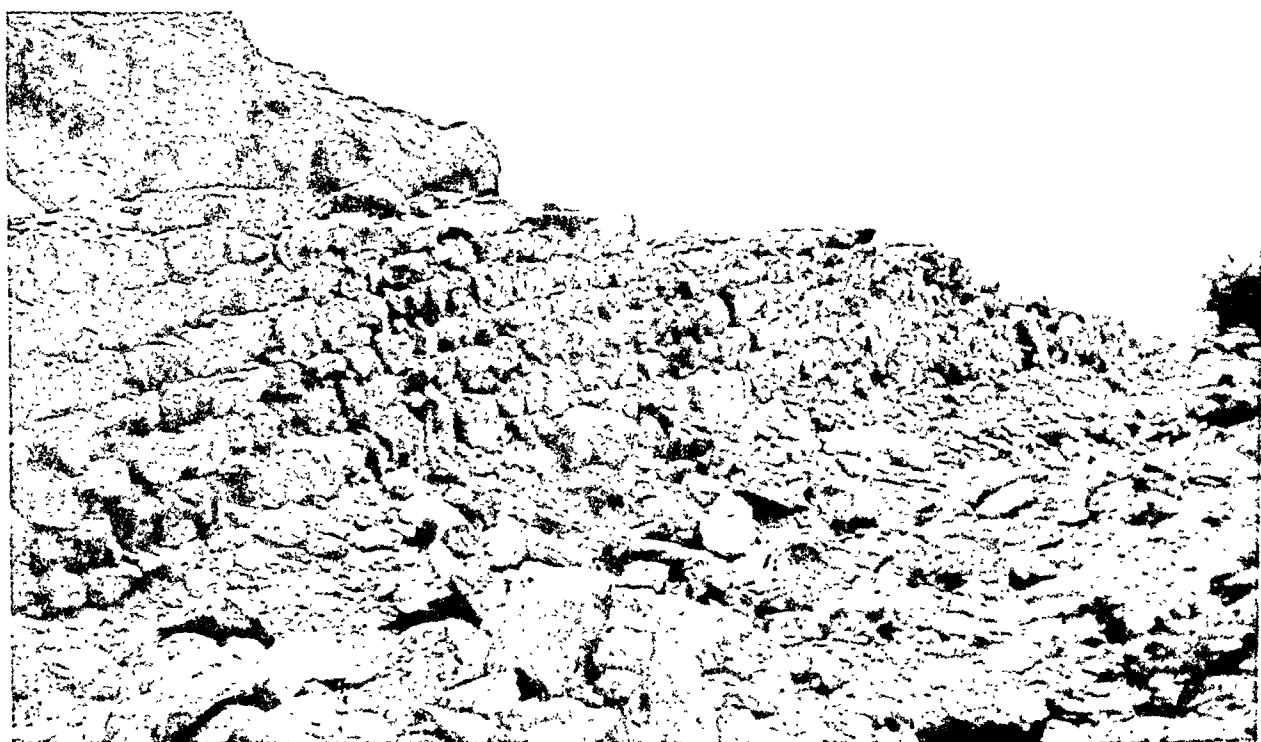
The small, irregular object with the faint, illegible characters, was found, outside of tomb
with four seals, fragment of the bottom of a tea bowl.



26. Rocky gorge of Wadi Fara' looking north at the point where the wadi leaves the mountains. The bed of the wadi at this point is solid rock.



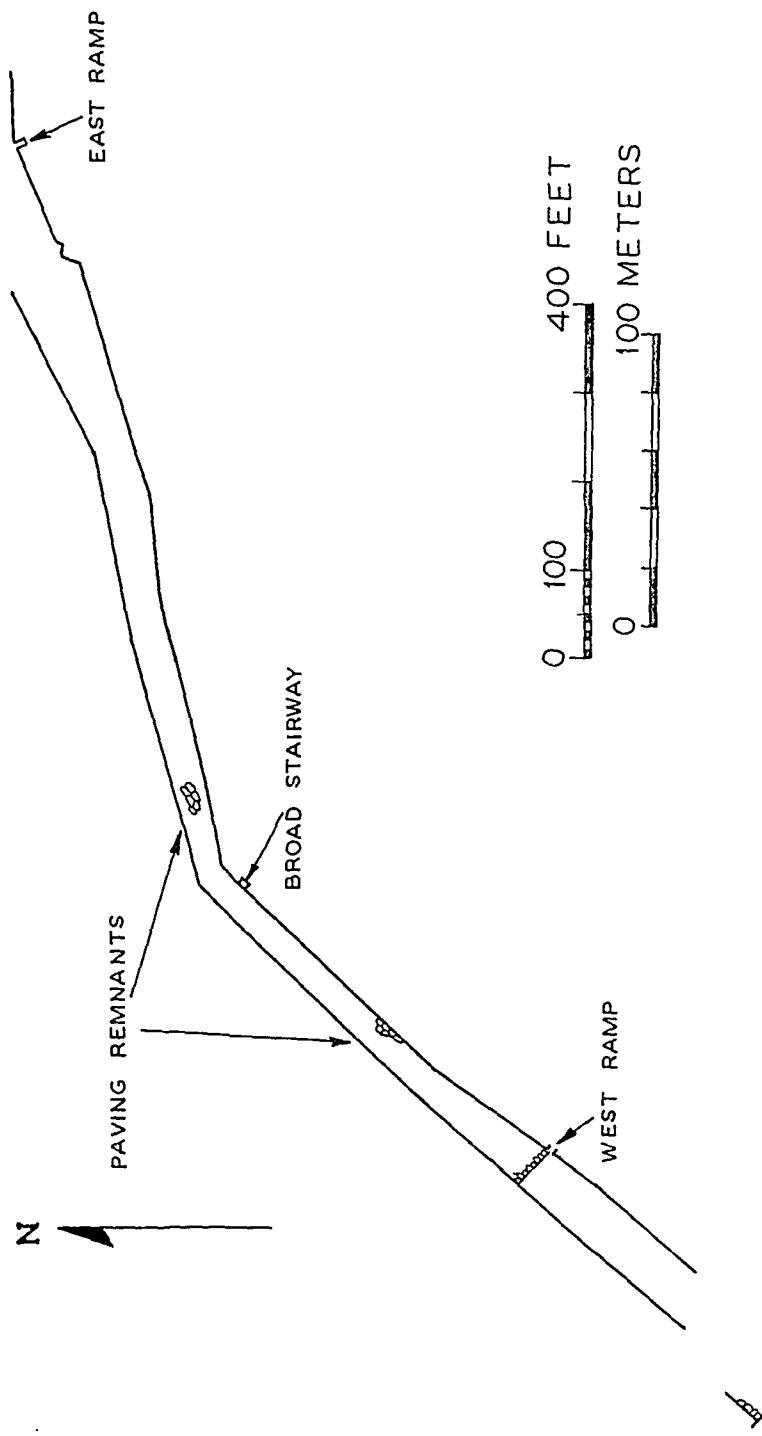
27. Water pool in Wadi Fara'. There are several such pools, some apparently fed by springs. The water found in Wadi Fara' is the only perennial water in Beih'in.



30. Part of the western section of the wall of Najd Marqad showing courses of blocks laid parallel to the natural contour. The area in the foreground was originally paved.



31. Broad stairway or altar on the south side of the central part of the Najd Marqad pass. The central portion at this point was originally paved.



PLAN OF WALLED PASS AT NAJD MARQAD

R.L.B.

32. Plan of the paved pass at Najd Marqad. The central part of the pass was paved with large stones which were deeper than they were wide. While the walls of the pass were almost parallel, the roadway appeared to be funnel-shaped when viewed from either end because the walls rose to a considerable height at the center.



ANCIENT TRADE ROUTES IN SOUTH ARABIA

Richard LeBaron Bowen, Jr.

W. F. Albright has pointed out that the camel was effectively domesticated some time in the late second millennium b. c.¹ Later, camel caravans were traveling north from South Arabia with the luxury products of the East, and the Queen of Sheba reputedly made her visit to Solomon (c. 950 b. c.) with one of these. As late as the second century b. c., the Arabians apparently still had a monopoly on much of this trade, although the Greek mariner Eudoxus had undoubtedly reached India from the Red Sea c. 120 b. c. It appears that part of the trade was carried in Arabian ships as well as by caravan, for a third century b. c. Himyaritic inscription found in Egypt tells of a Minaean who exported Egyptian goods to South Arabia in his own merchant ship.² Although the Arabians lost most, if not all, of the Indian trade to Greco-Roman merchants, it appears that they still sent most of their own products, frankincense and myrrh, north by camel caravans.

Today, the only frankincense forests are in Dhofār and only a few scattered myrrh trees now grow in the hills of South Arabia. One of the major industries of South Arabia today is salt mining, and salt is one of the main commodities of the modern caravan trade. At Aden, it is produced in salt pans in which sea water is evaporated. Inland, it is obtained from salt domes, which are scattered in the desert along the northern edge of the mountains. There are several salt mines in and around Shabwa, one at 'Aiyâd in Wadi Jirdân, one at Ṣâfir in Wadi

¹ W. F. Albright, *From the Stone Age to Christianity* (Baltimore, 1946), pp. 107, 120; Reinhard Walz, *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, 101 (1951), pp. 29-51; 104 (1954), pp. 47-50; *Actes du IV^e Congrès International des Sciences Anthropologiques et Ethnologiques*, Vienna 1952, III (1956), pp. 190-204.

² N. Rhodokanakis, "Die Sarkophaginschrift von Gizeh," *Zeitschrift für Semitistik*, II (1923), pp. 113-33.

Abrâd (85 km. east of Mârib), and one at Aiyâdîm near the desert end of Wadi Beihân (Plate 33).

These salt mines are usually underground, but some are open. The miners use small picks with pointed heads, actually more like hammers than picks, which leave characteristic parallel grooves on the rock salt faces. The salt is placed in goatskins for shipment. The miners are paid a certain amount for each camel load of salt, a camel load usually being two skins. A skin of salt weighs 150 to 200 lbs., so a camel load varies from 300 to 400 lbs. In Aden a "bag" of salt is officially 22½ lbs., so a bag of salt may well be derived from a skin, although the closeness to 100 kg. (220 lbs.) may not be coincidental.

Today the miners at Aiyâdîm receive as wages about $\frac{1}{4}$ riyal per camel load of salt. Philby states that in 1936 the miners at Shabwa received $\frac{1}{2}$ riyal per camel load of salt, while the miners at 'Aiyâd received $\frac{1}{3}$ riyal per load.³ The owners of the Shabwa mines received 1½ to 2 ryals per load of salt, while the 'Aiyâd owners received only $\frac{1}{4}$ riyal per load.

Aiyâdîm is today in the territory of the Bal Hârith, which has recently been brought under the control of Sherif Husein, ruler of Beihân, who taxes heavily all caravans carrying salt from Aiyâdîm. These caravans are usually owned by Bal Hârith tribes. If the salt is bound for Yemen, Sherif Husein extracts a tax of 25 ryals per hundred camels, but if the salt is bound for Beihân the tax is only one-half this rate, or 12½ ryals per hundred camels. Since a camel load of salt is worth 4 to 5 ryals, the tax rate is about 5 per cent and 2½ per cent respectively. Yemen officials take fifteen camel loads of salt out of

³ H. St. J. B. Philby, *Sheba's Daughters* (London, 1939), pp. 114, 330.

every hundred imported from the Beihān-backed Aiyādīm mines. This is presumably an effort to limit competition with the Ṣāfir salt mines of Yemen.

At Najd Marqad, Sherif Husein further levies an export tax of 2 riyals on every camel and an import tax of one riyal per camel regardless of the commodity carried. This export tax is in addition to the salt tax levied on the mine owners. As can be seen by the rates, the export tax and the salt tax are both designed to discourage salt and other commodities from leaving Beihān. Caravans from Shabwa can go to Mārib without touching either Beihān or Najd Marqad. Sherif Husein was not able to tax these caravans and he was considering building a customs post northeast of Najd Marqad on the edge of the desert in an attempt to tax this trade.

As we have seen, salt is today one of the main caravan commodities. Salt from Shabwa is usually sent to Hadhramaut. Salt from Aiyādīm is carried to Beihān, Ḥarib, and Mārib. Salt from Ṣāfir goes to Mārib and Jauf. In ancient times there must have been the same demand for salt, so that these same salt mines and routes have probably been in use for millennia. It should also be noted that, since there were no salt pans in Aden in ancient times, salt was probably an important south-bound caravan item, being shipped to Aden and Qana. Though salt is not mentioned by the classical geographers or the author of *The Periplus of the Erythraean Sea*, it is easy to see how such an unromantic item used only locally would not be mentioned. It was probably the network of routes for carrying salt and other staples that was expanded in later times to handle the caravan trade in incense and other luxury items.

Any attempt to trace the ancient trade routes in South Arabia is obviously very difficult without a reliable topographical map of the area showing the correct locations of the ancient towns and also showing the physical geography of the area. Freya Stark attempted to trace the incense route, but used a sketch map full of serious geographical errors.³ James Duncan provided a sketch map of the area for his discussion of ancient trade routes, but because of numerous inaccuracies in the map, he has placed several

routes in nonexisting valleys and over difficult terrain.⁴ A recent map of southwest Arabia compiled by F. Heybroek, incorporating his own and von Wissmann's unpublished work, makes the following study of ancient South Arabian trade routes possible (Plate 33).

To lay out a route one needs two points between which to work. In the south we have two ancient ports on the shores of South Arabia mentioned by most of the classical writers: Eudaemon Arabia (which has been identified as modern Aden), and Cana, or properly Qana (which was probably located at modern Bir 'Ali). For the moment let us assume that the northern route passed through Mārib, el-Jauf, and Nejrān, in that order. We shall now consider the possible routes between Mārib and the shores of South Arabia.

Ancient caravans had two great obstacles in their way in traveling from the southern shores to northern Arabia: the southern mountains and the Ramlet Sabatein. However, between these two geographical barriers there is a wide plain so level in places that an automobile can be driven over it at 60 miles an hour. A look at the map will show that this plain cuts a wedge in the southern mountains between Wadi Jirdān and Wadi Markhah; this is the so-called "Niṣāb triangle." West of the Niṣāb triangle the Ramlet Sabatein almost touches the mountains, usually stopping just short of them. The easiest route would presumably be in the level area between the mountains and the Ramlet Sabatein, where possible.

When considering caravan routes in a country like Arabia, it should be noted that the country is geographically rugged and climatic conditions have not changed much in several thousand years. It would seem logical to consider the existing routes first, for in many instances it would be difficult for a road to take any other course without going far out of the way. Such is certainly the case of the Aden-Beihān route, for today camels probably follow almost the same track that they did two thousand years ago over much of the route. The route goes north-east from Aden to Lōdar and el-Beidhā. El-Beidhā is on the Beihān watershed at the head of Wadi Beihān. A few miles to the east of el-Beidhā is the ruin of Imwādīya, which was

³ F. Stark, *The Southern Gates of Arabia* (New York, 1936), pp. 291-315.

⁴ J. Duncan, "Routes in Southern Arabia," *Antiquity*, 13 (1939), pp. 361-65.

first reported by Stewart Perowne.⁶ Im'âdiya is a small site and the remains of only four large buildings are visible, on one of which there are two large-lettered Himyaritic inscriptions in relief.

Once past el-Beidhâ the route simply proceeds down Wadi Beiħân as it probably always has. For Mârib-bound caravans the shortest route was through the Mablaqah pass west of Hajar bin Humeid, down Wadi Ḥarîb, and along the edge of the Ramlet Sabatein to Mârib. Thus the caravans would not have to leave the protected wadies until Ḥarîb. It should be noted that caravans did not necessarily have to go by the Qatabanian capital at Timna' (modern Hajar Kohlân), even if an ancient route did pass through the lower Wadi Beiħân. This was undoubtedly the ancient route between Aden and Mârib, and the presence of Im'âdiya within patrol distance of the direct route over the mountains suggests strongly that the route was well used in ancient times.

While there are several possible routes from Bîr 'Ali to Mârib, the shortest route would seem to be up Wadi Maifa', down Wadi Jirdân, and then through the lower reaches of Wadi Beiħân (known locally as Wadi Dammais and Wadi Bal Ḥârith) to ancient Timna'. Wadi Beiħân has very conveniently washed a "highway" completely through the Ramlet Sabatein, making an easy path across the high sand dunes. However, a more southerly route following along the mountain edge is also possible. This route could follow a south branch of Wadi Maifa' through Habbân, and then into the plains, across Wadi Markhah to Timna'. The only obstacle is the sand which completely touches the mountains just east of Timna'. But since there are some tracks across the sand today, the use of this route in antiquity is not out of the question. As a matter of fact, there is evidence that the sand may not have moved as far south in ancient times. Some of the ancient Qatabanian fields are buried under considerable deposits of sand that could only have blown in after the fields ceased to be used in the early centuries of the Christian era. Actually this latter road from Bîr 'Ali to Timna' is one of the straightest routes between the two points, and probably the easiest road

across the Jol for goods coming from an easterly direction on the coast.

After leaving Timna', any Mârib-bound caravans could go along the mountain edge to Najd Marqad, and then on to Mârib. It should be noted that the caravans coming from the east and going through Najd Marqad probably did not go through Mablaqah pass, since it would have added about a half a day to the trip. As was mentioned above, today there is a fork in the route from Beiħân to Mârib, so that caravans can branch off to the north and miss Najd Marqad and Ḥarib. In ancient times this same northern alternate must have been possible, but strong patrols could have forced the traffic through the control point at Najd Marqad.

Duncan admits that the present Aden-Beiħân route is fixed by the physical geography of the area in a well-defined road which was probably not much different in ancient times from today. But in searching for the incense route, he summarily dismisses the Aden-Beiħân route, on the grounds that there are no extensive ruins at the Aden end to warrant assuming its importance in antiquity. He argues that there is only *one* route which fulfills the necessary qualifications, and that this route started at Ḥuṣn el-Ghurâb, just west of Bîr 'Ali, where there are "extensive ruins which are a rough indication of its ancient role as the frankincense port."⁷

Duncan runs his route from Bîr 'Ali to Mârib via Nuqub el-Hajar, Niṣâb, el-Hajar, and Nuqûb. Nuqub el-Hajar is in Wadi Maifa', a short way from Bîr 'Ali. To get to Niṣâb necessitates going well south of the routes considered above. Nevertheless he takes the route from Niṣâb to Timna' through a nonexistent Wadi el-Hajar in which he places the ruins of el-Hajar. Perhaps these are the ruins at Ḥuṣn el-Hajar, south of Nuqûb in Wadi Beiħân. Duncan locates Timna' at Nuqûb; actually it is at Hajar Kohlân, a few miles north of Nuqûb.

The ruins at Nuqub el-Hajar were discovered by Wellsted in 1835.⁸ The ruins are standing on a hill in the center of Wadi Maifa', some miles up from the sea. Wellsted states that the ruins are nearly 800 yd. in length and about

⁶ J. Duncan, *op. cit.*, pp. 364 f.

⁸ J. R. Wellsted, "Narrative of a Journey from the Tower of Ba'l-haff, on the Southern Coast of Arabia, to the Ruins of Naṣab al Ḥajar, in April, 1835," *Journal of the Royal Geographic Society*, 7 (1837), pp. 20-34.

350 yd. wide. This is slightly larger than the ruins of Timna', and would cover about 60 acres. A massive wall 30 to 40 ft. high completely encircled the city.

Wellsted is also credited with the discovery of the ruins of ancient Qana [Cana of the *Periplus*] at Ḥuṣn el-Ghurāb on a volcanic promontory opposite Bir 'Ali. Ḥuṣn el-Ghurāb is a rocky volcanic crater about 150 m. high. There are the remains of a paved way up the side of the crater with two inscriptions nearby, one of which mentions Qana. There are the ruins of numerous buildings on top of the crater, and Wellsted mentions one massive square tower on the edge of the precipice overlooking the sea. He noted that this may well have served both as a watch tower and a lighthouse, since it could still be seen for many miles at sea; this is a very pertinent observation coming from a sailor. There were also great "tanks" (cisterns) for water storage at Qana.

Many people have been obsessed with the idea that there was one single route—the incense route—from the southern shores of Arabia to northern Arabia, carrying both Arabian incense and the spices and luxuries of India and Africa. James Duncan was looking for one single route when he decided that the ancient Aden-Beīḥān route was insignificant. Freya Stark had the same idea when she did her first work on the incense route, and decided that the route went from Qana up to Wadi 'Amd (across one of the roughest parts of the Jol), past Ḥureidha to Wadi Hadhramaut, and then west to Shabwa, Beīḥān, Ḥarīb, and Mārib, thence to el-Jauf and Nejrān.⁹ Even with a good map Miss Stark would probably have drawn the same route, for at that time she was convinced that the ruins at Ḥureidha indicated the site of a huge Sabaean settlement. These ruins later turned out to be the extensive remains of ancient irrigation works.

There is no reason to assume that there was ever one single route north from the southern shores of Arabia. Undoubtedly there were always several routes in existence. Both Qana and Eudaemon Arabia are known to have existed contemporaneously, so there were probably at least two separate routes north from the coast. Duncan states there is a route connecting Im'ādiya and Niṣāb.¹⁰ While Niṣāb would be

out of the way for caravans going from Im'ādiya anywhere but to Qana, it would appear that there may have been a connecting route through the Wadi Markhah. Hamilton is satisfied that there was no single port on the shores of South Arabia in ancient times, but he would have a single route going north from the Niṣāb triangle, which he thinks was the southern terminus (and therefore collecting point) of the great incense route.¹¹

That Markhah was important in ancient times, either as the center of some power or because of the Qana-Mārib route, is seen by the fact that Hamilton reports a very large walled site at an-Nāb in Markhah, which he ranks next to Timna' in size in the western Aden Protectorate.¹² Since Hamilton had seen Shabwa, an-Nāb must be larger than Shabwa. Inasmuch as Timna' covers about 52 acres and the ruins at Shabwa cover about 20,¹³ the site of an-Nāb in Markhah would appear to cover between 30 and 40 acres. It is interesting to note that Hamilton further reports that south of Niṣāb lies the "hill ruins" of Mariba, which he associates with the Marsiaba reached by Aelius Gallus in 21 B.C. This idea is fanciful, since most scholars are satisfied that Strabo's Marsiaba is modern Mārib, known to be the site of ancient Maryab Mariaba, long the Sabaean capital. The fact that some scholars confuse Maryab-Mariaba-Marsiaba with the ruins near the modern town of Maryamah in Beīḥān is apparently due to Carlo Landberg's report relating that he was told there were extensive ruins there.¹⁴ However, these ruins are mostly of extensive irrigation systems.

The *Periplus* refers to Cana [Qana] as the port for the frankincense country and further states that it was under the control of the king of Hadhramaut.¹⁵ The *Periplus* also relates that goods from India came into Eudaemon Arabia until the destruction of the port by Charibael [Karib'il Watar] of Sabā', who moved the port to Muza [Mocha].¹⁶ When Karib'il Watar moved

⁹ R. A. B. Hamilton, "Six Weeks in Shabwa," *Geographical Journal*, 100 (1912), pp. 110-1.

¹⁰ R. A. B. Hamilton, "Archaeological sites in the Western Aden Protectorate," *Geographical Journal*, 101 (1913), 110-17.

¹¹ H. St. J. B. Philby, *op. cit.*, map.

¹² C. Landberg, *Arabia* (Leiden, 1911), v, pp. 21-2.

¹³ *The Periplus of the Erythraean Sea*, translated and annotated by W. H. Scholl (New York, 1921), p. 22.

¹⁴ *Ibid.*, part 2.

⁹ F. Stark, *op. cit.*, pp. 291-315.

¹⁰ J. Duncan, *op. cit.*, p. 363.

the port of entry for Indian goods from Aden to Muza, he was doing the logical thing. The Sabaeans were then the rulers of the whole southwest corner of Arabia west of Hadhramaut. Goods from India no longer passed through Wadi Beihān. After the destruction of Aden and the movement of the port of entry for the Indian trade to Muza, the people of Beihān were stripped of their revenue from this trade. It is most interesting to note that the *Periplus* gives the Sabaean capital as Ẓafār (not far from Yerīm).¹⁷ This would seem to indicate that the desert caravan route through the former capital, Mârib, had become much less important. The new route went through the new capital, and then north.

It seems from the *Periplus* that the Homerites [Himyarites], besides taking the Indian trade to Muza, also stripped Aden of certain other privileges and the trade with the East African coast. The *Periplus* refers to the African coast near Zanzibar as the "Ausanic coast," and further relates that a Himyarite chief governed it "under some ancient right that subjects it to the sovereignty of the state that is become first in Arabia."¹⁸ Presumably "Ausanic" refers to the ancient South Arabian state of Ausān. Although little is known of this state, the evidence available seems to indicate that it was one of the important states, which probably lay south of Qatabān. It would be tempting to suppose that at one time Eudaemon Arabia was an Ausanic port, and that contact with its African colonies was carried on through the port. In destroying ancient Aden, Karib'il moved both the Indian and the African trades to Muza, the Himyarite port.

The northern part of the incense route may well have been a single road, passing through Nejrān and then north. Most scholars have assumed that it passed through Mârib on its way to Nejrān, and indeed we have assumed this at times. An extremely interesting fact is evident from an inspection of the map. Caravans could go from Bîr 'Ali to Mârib via Shabwa and completely miss Beihān, or they could go to el-Jauf and miss both Beihān and Mârib. This is possible because of a pass through the Ramlet Sabatein near Shabwa. So well defined is this passage through the sand that Philby was able to drive

¹⁷ *Ibid.*, par. 23.

¹⁸ *Ibid.*, par. 16.

an automobile through it in 1936. It is interesting to note that these two routes (one to Mârib and the other to the north to el-Jauf) are used today by caravans between Shabwa and these points. It should also be noted that caravans could go from Bîr 'Ali to Nejrān via Shabwa and Mushainiqā, and miss both Mârib and el-Jauf. Mushainiqā is the well where Philby found the Himyaritic water-signs.¹⁹ However, I have not seen any evidence that this route is used today.

There is a northern route from Hadhramaut to Nejrān running just south of the Rub' el-Khâli. This route also misses el-Jauf. Freya Stark was given the route stops while in Hu-reidha.²⁰ The route runs from 'Arudh to 'Ain (on the border of Hadhramaut), Huṣn el-'Abr, Mlais, Mishainiq (spring), Shira (good water), Hadhbar el-Jaid, Khalaifa (little water), and Nejrān. This route is verified by other sources. Since Stark's Mishainiq = Philby's Mushainiqā, where there are ancient Himyaritic water-signs, it would seem that the route from Mushainiqā to Nejrān was used to some extent in Himyaritic times. This would seem to indicate a connection with either Shabwa or Hadhramaut. Hamilton points out that only lightly loaded camels take the northern route from Huṣn el-'Abr to Nejrān, thus indicating that the route is more difficult than the average camel route.²¹

It is difficult to picture Shabwa as the capital of the fabulous Incense Land. Shabwa lies in a barren area of desert with no large habitations around for dozens of miles. Today the last true western outpost of the Hadhramaut valley is at Qa'ūdha, almost a hundred miles across the empty desert to the east by road. Shabwa is little more than a well in the desert, and even its well is not dependable, for in the very dry months the water becomes so saline that it is almost undrinkable. Hamilton relates that the Shabwa salt is second rate, and inferior to that of 'Aiyâd or Aiyâdîm.²² Although there is very little caravan traffic through Shabwa today, there seems little doubt that Shabwa's importance to Hadhramaut in ancient times lay in its salt deposits, for Hadhramaut has none.

To the west of Shabwa is the Ramlet Sabatein,

¹⁹ H. St. J. B. Philby, *op. cit.*, pp. 42, 44, 55.

²⁰ F. Stark, *op. cit.*, p. 303.

²¹ R. A. B. Hamilton, "Six Weeks in Shabwa," *Geographical Journal*, 100 (1942), p. 110.

²² *Ibid.*, p. 109.

to the south is the Niṣāb triangle, while Qatabān was to the southwest. Ancient Shabwa was not very large when compared with Maryab (200 acres) or Timna²¹ (52 acres), for the ruins of the old city have an area of only 20 acres. Himyaritic inscriptions found in and near Shabwa by Philby range palaeographically from the first century B.C. to the early centuries A.D., and thus would seem to indicate a late date for Shabwa. Albright holds that on the basis of the inscriptions, the ruins at Shabwa are probably mostly of Roman age.²² Hamilton, who conducted an excavation at Shabwa, states that the surface remains are determinable and belong approximately to the second or third century A.D.²³ He excavated one small area to a depth of 18 ft. and found that the foundations of the buildings were resting on rock salt, suggesting that the ruins may be equally shallow elsewhere.

The country around Shabwa was probably the same two thousand years ago as it is today. There is no evidence of any extensive ancient cultivation or habitation between Hadhramaut and Shabwa. Shabwa therefore must have been a Hadhrami frontier post serving a dual purpose of protecting the Shabwa salt as well as the caravan routes. There is evidence from the classical writers that Shabwa had an important function in the incense trade. The *Periplus* relates that inland from Qana lay the metropolis of Sabbathā [Shabwa]. It further states that "All the frankincense produced in the country is brought by camels to that place to be stored, and to Cana [Qana] on rafts held up by inflated skins after the manner of the country, and in boats."²⁴ Unfortunately this is all that the *Periplus* has to say about Sabbathā. However, Pliny adds considerably to our knowledge of Shabwa [his Sabota], and corroborates the statement in the *Periplus* that the incense was brought to that city:

Frankincense after being collected is conveyed to Sabota on camels, one of the gates of the city being opened for its admission; the king^s have made it a capital offence for camels so laden to turn aside from the high road. At Sabota a tithe estimated by measure and not by weight is taken by the priests for the god

they call Sabis, and the incense is not allowed to be put on the market until this has been done; this tithe is drawn on to defray what is a public expenditure, for actually on a fixed number of days the god graciously entertains guests at a banquet. It can only be exported through the country of the Gebbanitae [Qatabanians], and accordingly a tax is paid on it to the king of that people as well. . . . Fixed portions of the frankincense are also given to the priests and the king's secretaries, but beside these the guards and their attendants and the gatekeepers and servants also have their pickings.²⁵

The *Periplus* was probably written about 50 A.D. Albright has shown that the independent kingdom of Qatabān came to an end about the turn of the Christian era, and that Beihān was ruled by Hadhrami kings for perhaps over a hundred years.²⁶ The fact that the *Periplus*, which is quite accurate concerning South Arabia, does not once mention Qatabān, would seem to substantiate the fact that Qatabān was not in existence then. Pliny was writing between 73 and 77 A.D. The fact that Pliny frequently mentions the Gebbanitae [Qatabanians] and Timna^a as capital of the Gebbanitae indicates that Pliny's source for the material must have been written at least in the first century B.C., and probably earlier. Inasmuch as Ma'in was once dependent on Qatabān, the statement that the incense could only be exported through the country of the Qatabanians may mean that the route went north from Shabwa across the Ramlet Sabatein to el-Jaus or that it went west through Timna^b. The former seems to be substantiated by Pliny himself, for he says that "Adjacent to the Artramicite [Hadhramis] is another district, the Minaei, through whose territory the transit for the export of the frankincense is along one narrow track."²⁷

The statements of the classical writers seem to indicate that all the Arabian frankincense in ancient times came from the Hadhrami controlled lands of the Dhofār coast through Qana (see Appendix II). As we have seen above, frankincense from this region was brought to Shabwa by camel and stored, presumably to be transshipped north later. This suggests that the caravans that brought the frankincense to

²¹ W. F. Albright "Chronology of Ancient South Arabia," *Bulletin of the American School of Oriental Research*, no. 119 (1950), p. 14, note 20.

²² R. A. B. Hamilton, *op. cit.*, pp. 115-16.

²³ *Op. cit.*, p. 27.

^a Pliny, *Natural History*, translated by H. Rackham (Loeb Classical Library, London, 1911), I, 32.

^b W. F. Albright, *op. cit.*, pp. 94.

^c *Op. cit.*, I, 30.

Shabwa were not necessarily the same ones that carried the frankincense on north. However there may have been two routes by which frankincense was carried to Shabwa, one through the Hadhramaut valley and one from Qana.

It seems probable that myrrh was grown in Qatabān. I discovered unusual discolored circles on the ancient flat silt field surfaces that undoubtedly reflect the positions of some kind of trees that were grown in Qatabān. The trees were usually placed in rows about 3 or 4 m. apart in both directions. This would seem to eliminate such trees as the 'elb and the date palm, since these would require more room than 2 m. on each side to grow. This will be discussed in greater detail in the section on irrigation.

Many explorers have reported that myrrh trees are still growing in the hills of South Arabia, usually at an elevation between 600 and 1500 m. The frankincense tree grows in Dhofār between 600 and 750 m. Thus the myrrh tree seems to grow wild at higher elevations than the frankincense tree. Indeed, I located a tree whose gum was reddish in color, that must have been a myrrh tree growing in a rocky ravine in Beīhān between 900 and 1200 m.

It is not surprising to find myrrh trees in Beīhān, for Pliny lists seven types of myrrh from as many districts in Arabia. One of these is the Minaean myrrh which included the Astramitic, Gebbanitic, and Ausaritic from the kingdom of the Gebbanitae [Qatabanians].²⁹ To substantiate this we have Strabo's account of Aelius Gallus' invasion of South Arabia in 24 b.c. After much toil and hardship Gallus reached Marsiaba which, as we have seen, most scholars have assumed to be the present town of Mārib. Gallus was told by prisoners that he was "two days' journey from the country that produced aromatics."³⁰

While most scholars have accepted the supposition that Gallus reached Mārib, they have doubted the statement that he was but two days' journey from the incense country, mainly by assuming unnecessarily that this referred to the Hadhramaut valley. Since Beīhān is only about 65 km. from Mārib, and since it seems probable that there were extensive groves of myrrh trees in

Beīhān, Gallus was in fact only about two days' march from an aromatic region.

There are several other suggested routes that should be considered. Ingrams made a trip down the previously unexplored lower reaches of Wadi Hadhramaut, which is known as Wadi Masīla.³¹ About 20 miles east of Tarīm in this wadi is the large ruin of Huṣn el-'Urr on an isolated hill which rises some hundred feet above the wadi bed. Ingrams located some previously unreported Himyaritic inscriptions on the walls of the ruins. Farther on towards the east he located three similar ruins on promontories in the wadi. The farthest was not over 50 miles from Tarīm. Ingrams concludes that these ruined forts suggest that Wadi Masīla formed one of the high roads to the interior.

The lower part of Wadi Masīla is in Mahra country, and Ingrams points out that Mahra caravans rarely go higher than 'Eināt. These caravans carry rice, dates, grain, and dried fish. Today Tarīm is supplied by the route from Shihr, over which about 32,000 camels travel yearly, according to Ingrams. The only traffic that could have traveled the Wadi Masīla route in ancient times was the incense from Dhofār, and there is no reason why it could not have come into Hadhramaut by this route. However, this would have to have been before the time of the *Periplus*, which relates that the frankincense was brought to Cana [Qana] on rafts and in boats. More important than this is the fact that the *Periplus* does not mention any port between Qana and the Dhofār coast. It would seem more probable that these ruins in eastern Hadhramaut are simply the ruins of cities whose inhabitants were carrying on cultivation in times when the Hadhramaut valley was extensively cultivated farther to the east.

Mrs. Ingrams visited ruins in Wadi Bana (previously visited by von Wrede).³² There were 2-m.-wide walls standing 5 m. high, with a gate that looked very similar to the South Gate of ancient Timna'. The wadi below was banked by steep cliffs and wherever there was a possible route up the wadi leading in a direction other than the wall and gate, it had been blocked by high stone walls so that traffic was forced to pass

²⁹ *Ibid.*, 12: 35.

³⁰ *The Geography of Strabo*, translated by H. L. Jones (Loeb Classical Library, London, 1930), 16. 4. 24.

³¹ W. H. Ingrams, "Hadhramaut: A Journey to the Sei'ar Country and Through the Wadi Maseila," *Geographical Journal*, 88 (1936), pp. 544-49.

³² Mrs. H. Ingrams, "Excursion into the Hajar Province of Hadhramaut," *Geographical Journal*, 98 (1941), p. 131.

through the gate. This route connects with Bir 'Ali and Wadi Dô'ân. While this may have been a route at some time, it would seem that it was for traffic in and out of the Wadi Bana, rather than a route from the coast to the interior. Mrs. Ingrams was told that incense trees were still plentiful in the hills around the vicinity of Wadi Bana.

There may well have been two main incense routes coming into Nejrân. One from Shabwa via the Ramlet Sabatein short cut brought frankincense (and probably myrrh) from Dhofâr, and the one from Qatabân brought myrrh. It also seems that the Dhofâr incense may at times have passed via Beihân, Ḥarib, Mârib, and el-Jaut, when conditions were peaceful and the tariff exacted by the western kingdoms was not excessive. If a route along the northern edge of the Ramlet Sabatein from Shabwa to Mârib or el-Jauf is as easy as some have claimed, there would seem to be little reason for the Hadhrami incense from Shabwa to pass through the western kingdoms and pay a toll.

On the other hand, it seems that the trade in spices and luxuries from Africa and India came mostly through Aden and passed through Beihân up to the time that Karib'il, King of Saba', moved the port of entry for Indian goods to Muza on the Red Sea. The African trade may have been moved to Muza at that time. Presumably these Indian and African goods went inland through the new capital of the kingdom at Zafâr, and thence northward to join the other traffic at el-Jauf or Nejrân, although it is an acknowledged fact that much of this traffic passed up the Red Sea by ship in later times.

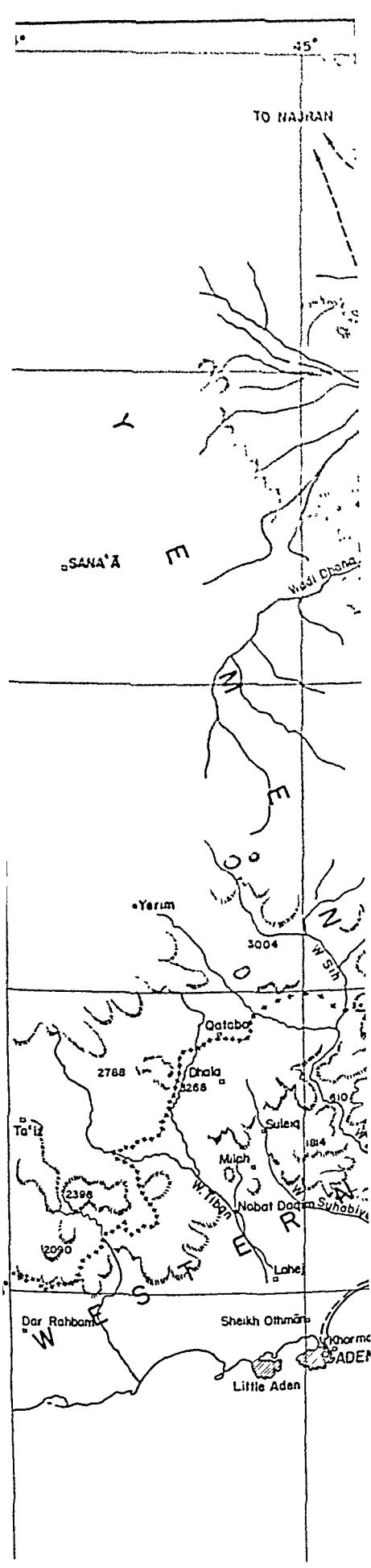
There would seem to have been a separation between the western kingdoms (Qatabân, Saba', Ma'in, and 'Ausân) and Hadhramaut at almost all times, not only geographically, but also in respect to the caravan routes and the types of goods that passed over them. Of course this

would not apply to the time when Qatabân was part of the Hadhrami empire.

Various inscriptions collected over the years show a continual change in power of the kingdoms bordering the Ramlet Sabatein. In some inscriptions Ma'in is dependent on Qatabân. Other inscriptions tell of many years of war between Qatabân and Saba', while still others list Qatabân as the ally of Saba'. Hadhramaut appears through the years as both the enemy and the ally of the various western kingdoms. The work in Beihân by the American Foundation Arabian Expedition showed that Qatabân was probably subdued by Hadhrami forces about the start of the Christian era and ruled by kings of Hadhramaut for several generations before the kingdom of Saba' and Dhû Raidân conquered the valley.

In the final stages of the South Arabian kingdoms, there were two great powers: the Himyarites in the west and the Hadhramis in the east. We have seen that ancient Aden was destroyed just after the start of the Christian era, and that the route going from Aden to Beihân was probably moved into Yemen, starting from the port of Muza and passing through the new capital at Zafâr. Presumably Hadhramaut still maintained its route from Qana to Shabwa.

It seems to be clear that there probably never was any single unique incense road or *high road* in South Arabia. There were undoubtedly many roads that fluctuated in importance as the various South Arabian kingdoms rose and fell. Pliny is probably as much responsible as anyone for the idea of a single road by his description of "a single narrow road," "the high road," etc. This short study of the ancient South Arabian trade routes is not intended so much to identify any particular route as to show that a number of routes were possible, depending upon the existing political conditions of the various powers in South Arabia.



IRRIGATION IN ANCIENT QATABĀN (BEIHĀN)

Richard LeBaron Bowen, Jr.

INTRODUCTION

It was not until 1763, after Carsten Niebuhr returned from his epochal trip to South Arabia, that scholars first realized the existence of an unknown ancient South Arabian script. Thousands of Himyaritic inscriptions have been published since that time, and they are full of references to the irrigation carried out by the ancient states of South Arabia in the period ranging from about 700 B.C. to the early centuries A.D. One such state was Qatabān, which centered around Beihān and Ḥarīb, two valleys leading northward into the desert from the mountain massif which is concentrated in South Arabia (Plate 34). The vast number of ruined irrigation works now known in Beihān shows that Qatabān was no exception to the general high development of irrigation in ancient South Arabia. In fact they indicate that Qatabān may have been one of the most highly developed agricultural areas in South Arabia.

The north side of the South Arabian mountains faces the great Arabian desert and thus has in general a typical desert climate. However, the monsoon winds, which blow along the South Arabian coast for six months in one direction and then reverse for the next six months, usually bring some rain to the valley at the change of the winds during April-May and October-November-December. The rains are like those of all such desert areas: sometimes there is none for several years. When the rains do come to Beihān there are usually flash floods. These sometimes fill the smaller lateral wadies, but often also fill the main Wadi Beihān, whose bed runs for 65 km. into the sandy waste past the point where the

wadi leaves the mountains. Thus a wadi in Arabia corresponds to an "arroyo" in the American southwest. The Arabs call such water *seil*. In this work *seil* will be used to describe the water that fills the wadies after a rain. Irrigation which utilizes this water will be called *seil* irrigation rather than "flood irrigation," to avoid confusion with perennial river floods.

The American Foundation Arabian Expedition reached Beihān in 1950 by driving westward from Hadhramaut. While in Hadhramaut I had an opportunity to examine hastily the Pleistocene silt which Miss Gardner referred to as "aeolian silt," partly alluvial and partly aeolian.¹ Miss Gardner described numerous examples of natural alluvial terraces. My first impression of Beihān was that there were similar evidences of the same type of silt terraces. However, after finding buildings, irrigation works, and other remains buried in the Beihān silt, it was obvious that the silt covering these works must be of relatively recent origin. It was my final conclusion that there is no silt visible in Beihān that owed its existence to natural geological causes. This is rather surprising in view of the fact that the silt was deposited in many places to depths of 15 to 18 m. (over 58 ft.). The "terraces" turned out to be simply different levels of ancient agricultural silt, usually found where two adjacent areas were irrigated from different water sources.

If the towering silt deposits in Beihān were of natural origin, they would be of considerable geological interest, but since it can be proved that they are the result of ancient irrigation,

¹ G. Caton Thompson and E. W. Gardner, "Climate, Irrigation, and Early Man in the Hadhramaut," *Geographical Journal*, 93 (1939), pp. 18-38.

these deposits instantly become the most interesting geographical feature in Beihān. So deep and so extensive is this silt that it undoubtedly forms one of the most extraordinary sedimentary deposits in the world. In the 1500-odd years since organized Qatabanian agriculture ceased, natural erosion has made grotesque patterns in the ancient fields. Today there are miniature canyons, gigantic gullies, and isolated buttes visible at many places to attest to the success of Qatabanian agriculture. Only in rare instances is the original field level preserved for any great distance.

SCOPE OF WORK

I examined a large part of Wadi Beihān and its tributaries for evidence of ancient irrigation. All the areas where ancient silt was found are shown in Plate 35. Of the many areas where irrigation was carried out in ancient times in Beihān, two large areas were surveyed (Hajar bin Ḥumeid and Mablaqah) and the location of irrigation ruins were noted (Plate 36). Finally, a 1200-m. length of canal in the Hajar bin Ḥumeid area which had already been surveyed in Plate 36 was selected and the levels of all the irrigation ruins associated with it were determined to $\frac{1}{100}$ of a meter (Plate 37). Sluices are designated as "S," nondescript ruins as "M," probable houses as "H," silt sides and bottoms of canals as "C," and drops as "W."

Credit should be given here to Dr. Friso Heybroek and Mr. Nigel Groom for their work in preparing a map of the Wadi Beihān. In 1949 Groom prepared, by means of compass traverses, a sketch map of the whole valley, which was never published. In 1950 Heybroek surveyed the valley north of Jebel Reidān by plane table. Their results have been combined in a 1:100,000 map of the area (Frontispiece). It lacks contour lines, and the elevations of only a few of the highest peaks are given. The outlines of the valley plain and the mountains have been taken from the Heybroek-Groom map for the construction of Plate 35 and reduced one half to a scale of 1:200,000. The modern cultivation shown by the black areas has been sketched in mainly from

oblique aerial photographs made by the Royal Air Force. It should be noted that although no modern cultivation is shown in either Wadi en-Nahr or Wadi Ghabar, this is not to be taken as positive evidence that it does not exist, but simply as indicating the limit of the author's reconnaissance and the lack of aerial photographs. There is undoubtedly a small amount of modern cultivation in the Wadi en-Nahr. I have changed the location of Wadi Khirr and Wadi Mablaqah from that shown on the Heybroek-Groom map to make them consistent with the aerial photographs. Otherwise the map is excellent, and without it this survey of the ancient irrigation in Beihān would have been very sketchy indeed.

It was obviously desirable to make topographical maps of the two areas studied in detail (Plate 36). But such a task was utterly impossible, since the present study was a one-man project and had to be completed in less than six weeks. I myself acted as surveyor, photographer, and data-taker for the irrigation project. At times I had up to 50 Arab laborers excavating scattered irrigation ruins. Soon after I started the project I realized the magnitude of the task I had laid out. Irrigation ruins were scattered up and down the whole Wadi Beihān, a straight distance of over 30 km. I wanted to examine the whole valley, regardless of how incomplete the results would be in some areas. An irrigation project starts at the headwaters and ends when the final drop of water is used, so that even an elaborate study of a small area in the center gives little indication of the whole project. It was my desire to obtain enough data to determine the extent of irrigation in ancient times in Wadi Beihān, and also to reconstruct the precise method of irrigation used in one specific area.⁴

The soft silt composing the ancient fields is very susceptible to erosion, and the 1500 odd years of wind and rain have in places created a fantastic topographical surface that in most instances bears no resemblance to the original fields. In some cases gullies have eroded the ult

⁴ Besides the work on irrigation, I did all the surveys for the expedition's two main days during the last season in 1950 and also made an archaeological survey of the valley in spare moments. I fully realize that not all of the problems relating to the ancient irrigation system of Beihān are solved in this study, many questions remain that might have been answered with a few additional weeks of work.

down to the original valley surface, while in others sand blown in from the north has covered the fields. The extreme erosion would have made a good topographical survey very difficult indeed, and then would have indicated mainly the erosion which has taken place in the last 1500 years. However, there can be little doubt that such a topographical map would be of the utmost value in determining the exact configuration of the ancient fields. This is especially true of the Mablaqah silt, which appears to have been spared the fate of much of the Hajar bin Humeid silt.

The 1200-m. section of the canal that was selected for detailed study was just east of Hajar bin Humeid (Plate 37), the site of a large ancient ruined town where the expedition dug in order to establish a pottery sequence. A low point in the wadi bed west of Hajar bin Humeid was selected as a datum arbitrarily fixed at 0.0 m. Next a bench mark was erected on top of Hajar bin Humeid with an elevation of 22.60 m. Using the same datum, a bench mark was erected close to the canal system on a large rock outcrop with an elevation of 14.56 m. (Plate 37). The levels of the tops of all irrigation ruins associated with the 1200-m. stretch of canal were determined to the nearest $\frac{1}{100}$ m. relative to the 0.0-m. datum.

The elevations of the various parts of the canal system are therefore in meters above the Wadi Beīḥān bed in front of Hajar bin Humeid, but this does not mean that they represent the actual depth of accumulated silt deposit. While the figures do represent the deposit near Hajar bin Humeid, it must be remembered that before irrigation was started there was an alluvial fan sloping down from the mountain into the wadi bed. This fan is still under the silt and canal system, and thus its unknown depth above the 0.0 datum would have to be subtracted from any level taken on the silt to the east of Hajar bin Humeid to get the actual silt deposit. It should also be noted that as one goes north the general elevation of the valley floor decreases, so this counterbalances the depth of the alluvial fan. As neither the alluvial fan depth nor the drop in the wadi bed as it goes downstream (to the north) is known, the actual depth of deposited silt cannot be estimated (except near Hajar bin Humeid). This I stress in order to obviate a hasty conclusion that the elevations represent meters of accumulated silt.

TYPES OF IRRIGATION WORKS

One finds masonry in the ancient Qatabanian irrigation systems only at points where it was necessary to resist strong erosion. Thus there is stonework in the sluices where the water was let out of the canals, in embankments erected to stop erosion at bends in the canal, in sluices in the secondary distribution system used for handling the water after it was let out of the canal, and in "drops" used for bringing the water from a high level to a lower one. All connecting parts of the canals were of silt.

The sluices for letting the water out of the primary canal system were apparently of two types, typified by S1 (Plate 38) and S18 (Plate 39). The type illustrated by S1 conducted the water from the canal at right angles, while the type illustrated by S18 always led the water from the canal at an angle varying only about 30° to 50° from the axis of the canal. Other examples of perpendicular flow-off from the main canal are seen in W10 (Plate 40) and S13, a quadruple sluice (Plate 41). Sluices S10A and S26 (Plates 42, 43) are further examples of the angle sluice. The wedged wall of the angle sluice was apparently built into the canal wall with its inner face parallel to the canal axis. The angle wall was set back to provide a funnel-like entrance for the water from the canal (Plate 39).

The stone embankments found in the canal system apparently were placed at points where sluices or bends had caused eddies to erode the walls of the canal. Most of the embankments found are constructed in such a way that from the inside of the canal they present the appearance of a very steep flight of broad steps. These embankments are constructed of long blocks set on end in rows, with each successive row higher than the one in front of it (Plate 46). Most of the sluices leading from the main canal had exit drops constructed in this same manner (see W10, S18, and S1) to drop the water from the level of the canal to the level of the secondary distribution system (Plates 48, 49). The same type of long blocks are used in the level paving shown in the various sluices. I was surprised to discover that the depth of the paving blocks was about twice their width, since they often appear to be flat slabs. The great depth prevented the paving from being easily washed out. One embankment

(E10) in the canal section under study was simply an angled wall (Plate 42). This particular structure was the only embankment of this type observed.

The material connecting the various sluices and embankments in the canal was merely silt piled up to form an earthen wall. The canal bottoms were likewise sand and silt. One would hardly expect to find any evidence of either canal walls or bottoms after some 1500 years, considering that the canals were higher than the fields and thus subject to erosion first. Yet there is a surprising amount of evidence to indicate the location of both canal sides and bottoms, quite aside from the ruins of stone work. Once while watching sand being removed from S13, I noticed that to the north there was an eroded section of silt (C6) sloping towards the center of the canal (Plate 47), and I suddenly realized that this represented the sloping west side and bottom of a canal that existed about the time S13 was originally built (Plates 41, 44).

I located large sections of similar sloping canal sides (C4 and C5) and bottom (Plate 50) south-east of S1 (Plate 37). Careful examination showed that the canal bottom was flat and was made up of alternating layers of fine sand (not silt) and of thin layers of a clay-like substance sometimes containing brown organic matter. The "clay" was grayish in color, which contrasted with the brown field silt. Thin layers of clay tended to coat the outside of sand and clay alike and give the whole a gray color. Sections of canal bottoms or sides could be spotted by their gray color which contrasted with the brown and reddish brown of the silt field-masses.

In several instances I located sections of the canal bottom sloping upwards towards embankments. This is illustrated by E1 and E3A (Plate 45). In these cases there were alternating layers of fine sand and clay. The clay layers were about 10 cm. thick and the sand layers varied from 20 to 80 cm. In some instances the clay seemed connected with the sand below it rather than with that above, for in these cases the sand appeared to become finer and finer as it approached the clay layer. Thus these alternating layers may have represented a fine deposit of sand which graded into clay, although there was always a distinct interface between sand and clay.

When I first noticed these alternating layers of sand and clay, I thought that they probably

represented individual *seils* (flash floods), which first had a high load-carrying capacity and deposited sand, and then deposited increasingly finer material as the volume of the *seil* decreased. Certainly this would produce a deposit which became finer, but since the layers of sand and clay together varied from 30 cm. to almost a meter in thickness, it seems that these alternations cannot be the result of a single *seil* or even one season, as this would represent a deposition rate in the canal of over a meter a year. It might be suggested that the layers of clay represent years of little rainfall, and the layers of sand years of heavy rainfall. In any case the thickness of the clay layers would seem to be more than could accumulate as the result of a single *seil*. A natural silting of the canal would produce such an effect, with increasingly finer sediments being deposited as the gradient became less. The occurrence of numerous layers of sand and clay might seem to indicate that the gradient had been periodically restored, but since increasing and decreasing gradients are improbable, it does not seem that the alternating layers can be attributed to a natural silting of the canal.

So far we have assumed that a cycle consisted of the layer of sand with the clay layer on top, because in some cases the sand seemed to become finer as it approached the clay layer. Yet there was never an appreciable change in the size of the sand particles. If we assume that a cycle consisted of a layer of clay with a layer of sand on top of it, there is a simple explanation, consistent with the facts, to explain the abrupt changes from sand to clay. As we shall see below, the irrigation systems were operated with the sluices open, and were designed for the most rapid distribution of the *seil*. The exits of the sluices were left open at all times, since one never knew when a *seil* might come. It could come at night as well as in daytime. The bottoms of the sluice openings were initially built at some arbitrary distance above the bottom of the canal. With each *seil* some sediment was deposited on the canal bottom, and with each deposition the distance between the bottom of the canal and the bottom of the sluice opening became less. At some point there was apparently a general cutoff of the canal system, and all the sluice openings were raised. Once the openings were raised, the velocity of water in the canal was immediately decreased, since more water had to enter

the canal before water flowed through the sluice openings. It would seem probable that the clay was deposited after the sluice openings were raised. Deposits of canal bottoms can be found near Hajar bin Humeid representing about 7 m. In El (Plate 45) the bottom layer of clay and sand is about a meter thick, while in others there are minimum thicknesses of 20 to 30 cm. This would seem to indicate that the systems were altered at varying intervals.

HAJAR BIN HUMEID CANAL

We shall begin the study of the 1200-m. section of canal at a mountain spur to the south of S1, where there are two embankments E3A and E3B (Plate 37). The inside wall of the canal at this point is provided by the mountain side. Fifty meters to the northeast there is the large section of canal bottom (C5) mentioned above. Slightly east of this bottom section is a mass of silt that had apparently been piled up to provide a canal wall at one time. This is the segment of canal side shown by C4 in Plate 37. About 200 m. farther northeast is sluice S1, which discharged to the northwest, almost at right angles to the canal.

Farther on, 210 m. to the northeast, the canal apparently touched another mountain spur, since a sloped segment of canal side (C3) was found (Plates 37, 51). It should be noted that since the canal touched at the two spurs it thus hemmed in the area to the east. This constricted area silted up above the canal bottom so that eventually it formed a natural inner wall for the canal. Part of this "silt plateau" is still in existence, as shown in Plates 37 and 52.

To the north 170 m., sluice W10, a right-angle sluice, empties east towards the mountain. Progressing farther north we find a group of ruins scattered for 200 m. on both sides of the canal: two embankments, E10 and E11, mound M10 (which was not excavated), and a quadruple right-angle sluice, S13, discharging to the west. Then 80 m. past S13 there is another embankment, E12, and about 20 m. farther the excellent angle sluice S18. Going 130 m. farther north we find S29. This was not cleared of sand, but it

appeared to be a multiple installation of some kind. About 150 m. past S29 is a group of three ruins (M15, E13, and S25) which were apparently in the primary canal system, but were not cleared of sand. This was the northern limit of the canal section on which elevations were run.

Examination of Plate 37 shows that these primary irrigation ruins give an excellent idea of the shape of this section of canal. The canal takes a slightly sinuous course over the distance studied and is far from straight; nevertheless Plate 37 indicates that the width of the canal can be estimated with a fair degree of accuracy. In the area of S13, E11, E10, and W10 the canal is about 40 m. wide, and around S1 its width is the same. It should be noted that E3A and E3B indicate a narrower canal of about 25 m., while the gravel embankment behind E3A indicates a canal about 30 m. wide. As will be shown later, these embankments (E3A and E3B) are evidence of an earlier phase of canal construction than the phases represented by the rest of the ruins discussed. Thus it is probable that the west bank of the canal in its later phases was west of E3A. From this it follows that the earlier canal was narrower—at least at the spur by E3A and E3B.

LATE PHASES OF CANAL CONSTRUCTION

The ruins of the 1200-m. section of canal (with the exception of E3A and E3B) are the highest irrigation ruins in the area. These apparently all belong to more or less the same period, which may be called "Late Phases," to cover several phases of construction on the same canal. The elevations of the tops of these ruins of the Late Phases vary from 16.4 to 18.7 m.

An interesting example of different periods in the Late Phases is shown by the east elevation of S13 (Plate 44). The first stage was the construction of sluices which had openings equivalent in width to the final width shown plus the width of block Y. At a later period, in all three cases, block Y was added to decrease the width of the sluice openings as the sluice was continued upwards. The fact that in each case block

X extended past the width of the lower sluice might seem to indicate that at first the original sluice was only the height of block Y when completed; but this is improbable, and it seems likely that part of the left walls had been taken out in a reconstruction to allow block X to act as a tie-in, since another block of the same shape as Y placed on top of Y would be structurally weak.

Evidence to support this last theory is found in the fact that the proportions of the blocks in the upper part of S13 are markedly different from those in the lower part; the lower blocks are narrow and long while the upper blocks are more square. In the case of S13B (Plate 44), there are apparently several stages of reconstruction evident: a first stage of sluice construction, a second stage of narrowing the sluice and increasing the height, a third stage of raising the level of the outlet paving to 16.45 m., and then a fourth stage of raising the outlet paving to its final elevation of 16.85 m. The bottom of the foundations varies from 14.5 to 14.9 m.

Apparently in this last stage the whole structure protruding above the silt and sand canal walls was given a thick coat of plaster; this may be called the "Plaster Phase." When the plaster coat was applied, the level of the canal bottom was probably about 16.5 m. This has been estimated by the lowest point at which plaster is found on the front of the three sluices (Plate 44). The plaster at its lowest point appeared to have been applied against dirt, as it bulged out instead of tapering off, and had dirt embedded beneath it. Furthermore, this plaster line sloped up gently as the wall of the sluice curved around to meet the canal wall at right angles (Plate 44, S13A and S13B). This line undoubtedly indicates the position of the earth wall of the canal. It is probable that the lower paving (16.15 m.) in S13B was in place when the plastering was done, and that the highest paving was added at this time. Substantiating this view is the fact that some flat slabs had been placed in front of the sand underneath the top paving and were braced with other stones in front of the sluice (Plate 54), apparently to keep the top paving from being washed out. The walls of the sluices may have been raised farther at the time of this alteration.

Some very poorly constructed unplastered walls were added after the Plaster Phase to both S13A

and S13B, apparently to alter the direction of flow of the water leaving the sluices (Plate 53). Thus in the case of S13B, there is evidence of five different reconstructions. It should be noted that these additions were necessary because of the silting of the canal rather than the silting of the fields, as the evidence seems to indicate that the canal bottom was about 2.5 m. above the field levels. Most sluices in the Late Phases of the primary canal system at Hajar bin Humeid were plastered, and this Plaster Phase appeared to be the final stage in the construction of the canal system. The rough walls added to S13A and S13B later indicate that the system was used for some time after the Plaster Phase. Plaster was never found on any but the latest structures and was found only in the primary system, never in the secondary distribution system. Plaster was found on S13, S18, S1, E10, but never on the primary step embankments or on the step structures of the exits of any of the plastered works.

MIDDLE PHASES OF CANAL CONSTRUCTION

There is another group of ruins that apparently belong to more or less the same general period. These may be said to belong to the "Middle Phases" of the irrigation development. This group of ruins seems to indicate that some parts of the canal during this period ran farther west than in the Later Phases. These ruins start with E3A (Plate 45) and E3B at the mountain spur. Then going north, the next ruin of this group is E1 (Plate 37), slightly west of the later canal. The sluice W1 (Plate 40) may have been in this earlier canal system, although in the Later Phases it served as part of the secondary system for S1. About 350 m. farther south are S10A and S10B, the last examples of the Middle Phases of canal construction. S10A is an angle sluice (Plate 42), but its construction shows that the canal ran west of it, rather than to the east as its location relative to the later canal would indicate. The purpose of S10B was not so clearly evident. Its function was only to lie below S10A. The elevations of the various structures

ruins of the Middle Phases canal ranged from 13.3 to 14.7 m.

EARLY PHASES OF CANAL CONSTRUCTION

Two examples of ruins were found that represented "Early Phases" of the canal system, if they were actually parts of a canal. These are two embankments, E1 and E5 near the north mountain spur (Plates 37, 42). The elevation of the tops of these was about 12.0 m. That these were probably some part of a canal is seen by the fact that the stratified layers exposed in E1 indicate a canal bottom below 10.4 m. (Plate 45). The embankment E5 is an extraordinary structure with a semicircular wall over 2 m. thick, constructed of massive blocks with foundations at 7.9 m. There is a small connecting sluice on the mountain side at 10.4 m. (Plate 42).

CONSTRUCTION TECHNIQUES

There is a remarkable change in construction techniques as one goes from the Early Phases through the Middle Phases to the Late Phases of these canal works. We have already seen that the Early Phases were in some instances represented by walls of great thickness constructed from massive blocks. But small-block construction was also used. While E5 was constructed of blocks over a meter square, the adjoining sluice was built of very small irregular stones. It is as important to note that such huge blocks were apparently never used in any constructions of the Middle or Late Phases.

The Middle Phases were represented by S10A, a very nicely constructed angle sluice (Plate 56). Here again, the blocks in this sluice were very large compared to those of the Late Phases, but not as large as the massive blocks of E5. This sluice was beautifully constructed and was stand-

ing almost completely exposed, every bit as solid as when it was constructed. A number of blocks scattered around seem to indicate that there may have been another course on top of the three courses standing. The blocks of this sluice have remained exposed without being disturbed because it is practically impossible for any small group of men to remove a block. It took ten Beihāni workmen to replace a medium-sized block that had fallen over so that I could photograph the reconstructed sluice. The blocks are relatively square-cut (40 to 50 cm. high, 60 to 80 cm. wide, and 30 to 130 cm. long) and set without plaster, although when built, mud was probably used in the construction. Even after the mud was washed away the sluice still stands.

The sluices found in the Late Phases are without exception constructed from blocks that several men can carry, averaging 30 to 40 cm. high and very often square. Because of their handy size, the blocks of the Late Phases have provided building material for the town of Ḥenu and for various houses in the Ḥumeid area (as have other irrigation ruins for other towns). More drastic than a change in size was a change in the shape of the blocks. While the faces of later blocks were rectangular or square, and often very flat, the back was usually roughly hewn and the top and sides were tapered. The bottom was flat and at right angles to the face. Walls were made by laying a course and then filling in the space between the two faces with mud and stones. Then the flat bottoms of the blocks of the next course were laid on this.

In this writer's opinion the plaster found in the Plaster Phase was an absolute necessity to keep this type of construction from hopelessly collapsing. Without the plaster, water could wash out the mud, and the faces would buckle outward and collapse like a house of cards. This tendency is well shown in a modern *ḥuṣn* (fortress) constructed with these ancient blocks (Plate 55). This type of construction is better illustrated by houses of the same period, for there was apparently a tendency to use blocks with less taper in irrigation works.

It has been pointed out that none of the step embankments were plastered. It is also interesting to note that the step embankments never changed proportion greatly in all the instances at hand. There was apparently no evolution from large blocks to small blocks in these struc-

tures. However, the blocks used as paving in drops and the spillways of sluices (Plate 46) were much thicker (tending to be squarer in plan) than in embankments on the canal sides, which tended to be constructed of flat slabs (Plate 48). It is interesting to note that this step construction was also used for contemporary city walls (Timna') and is still used today in Wadi Beihān for irrigation works and for graves (Plate 57), although the blocks used today are not so carefully cut as in ancient times and often are egg-shaped river stones. The Late Phases did produce a new type of embankment in the form of a vertical wall, as shown by E10 (Plate 42). Its joints were plastered.

WATER DEPTH IN THE CANAL

Evidence may be found in several places for the depth of water carried in the canal during the Late Phases. The strongest evidence is found at S13 with its four sluice openings. When the structure was plastered, in one of the last stages of reconstruction, the plaster was apparently applied down to the level of the canal bottom in front of the structure. The level of the lowest plaster in front is about 16.5 m. The highest level of sand canal bottom (C6) just north of S13 is at 15.7 m. (Plates 41, 44). Since erosion must have removed some of this sand bottom, this corresponds to the 16.5 m. plaster level. If we assume that no major reconstruction was undertaken after the Plaster Phase, at least by way of increasing the height of the walls, we find that the highest part of S13 reached 18.2 m., as indicated by one block in S13B. The elevations of the sluice thresholds of S13 in all three cases averaged 16.85 m., about 35 cm. above the hypothetical canal bottom.

In S18, just north of S13 (Plate 37), the threshold of the sluice outlet was at 17.1 m. and the paving in front of the sluice was at 17.0 (Plate 39). When this paving in front of the sluice was constructed the canal bottom must have been below it, since otherwise there would have been no point in constructing it. Excavation showed that there were five courses in the

embankment in front of the sluice and that the top of the lowest course was at 15.9 m. The canal bottom was undoubtedly below this point when S18 was constructed. Taking a point a little below this we obtain about 15.5 m. for the canal bottom when S18 was built. The highest block in S18 reached 17.9 m. This would seem to indicate that about a meter of silt had accumulated in the canal between the time when S18 was built and the time when the plaster was added to S13.

In the case of S1 the threshold was at 17.0 m. while the paving in front of the structure was at about 16.9 m. The front part of the paving was washed away so that no stone embankment remained. The highest block in the structure reached an elevation of 18.7 m., and from an architectural point of view it does not seem that there were any courses above this, as the highest stone was a long block over a meter in length and about 45 cm. square. This block was used as a cap, and it had a companion bearing an inscription, now fallen (Plate 38).

Thus the data from three different sluices all point to the same general conclusions: sluice thresholds at about 17.0 m. and a maximum height of the sluices of over 18.5 m. A safety allowance must have been made for the top of the canal banks. Thus if we assume that the water probably did not rise in the canal over the 18.0-m. level, we have about 1.5 m. of water in the canal, with the canal bottom about 50 cm. below the threshold of the exit (in the final stage of operation). One is surprised to find that the canal was apparently level in the 600 m. span between S1 and S18. Our data would seem to indicate that it was exactly level, yet there must have been some gradient, though slight. It was probably closer to $\frac{1}{2000}$ than to $\frac{1}{500}$ (over the distance from S1 to S18 at any rate).

SECONDARY WATER DISTRIBUTION SYSTEM

As soon as the water left the main canal it entered the secondary distribution system. The irrigation works in the secondary areas in-

sisted mainly of right angle sluices of simple construction, as illustrated by S11, S12, S21, S27, S28, S102, and S103 (Plate 43). Occasionally in the secondary systems there was a double sluice, as typified by S101 (Plate 43), or an angle sluice of the usual general construction shown by S26 (Plate 43). Almost without exception these secondary structures were without paving or embankments and consisted only of the two (or three) walls. The only exception found is S21 (Plate 43), in which there was apparently paving. The lack of paving indicates that there was little if any drop in water level through these sluices. Thus, the assumption that the water was brought down to irrigation level by a drop built into the main sluices seems to be justified. The discovery of four drops, W1, W2, W3, and W4 (Plate 40) in the vicinity of S1 (Plate 37) indicates that in some instances the water may have been dropped a little more in the secondary system after it left the main canal. The drop built into S1 reached a minimum of 12.0 m. (Plate 38), so that it was actually below the four drops, W1, W2, W3, and W4. This would seem to indicate that the previous secondary system had silted up about a meter before these drops were built. There is a layer of about 2 m. of fine stratified sand over the end of the S1 drop, between 12.0 and 14.0 m. Thus, drops W1, W2, W3, and W4 apparently belong to the later stages of the Late Phases.

In most instances the course of the secondary canals could not be traced in the field with absolute certainty, and in some instances the location of the sluices seems impracticable. For instance, S28 appears to be discharging back towards the canal (Plate 37). But despite any apparent confusion in the orientation of the secondary irrigation works, their net effect was to conduct the water away from the main canal uniformly over the fields. This is substantiated by the apparent uniformity of the silt deposits.

It appears that the water leaving S1 was split into three streams: one to flow through W2 or W3, another to flow through W1, and a third to flow through W5 and S2 after flowing between W4 and E2 (Plate 37). How the water was split three ways was not discovered, but probably the evidence is buried beneath a large sandy mound only 20 m. west of S1. A single right-angle sluice could have achieved the desired result.

In the case of W10, the water was apparently split three ways by S11 or S12. Sluice S12 is a meter above S11 and is thus the later structure. The foundations of S12 are at exactly the same elevation as the top of S11, so S12 was undoubtedly built after S11 had been buried in silt. If these sluices are relatively intact, which seems likely, they indicate a maximum of 50 cm. of water in this part of the secondary canal.

All of the secondary sluices and drops discovered apparently belong to the Late Phases of irrigation, since all the sluices were constructed of the small blocks characteristic of this period. Also, all were at about the same elevation.

PROBABLE ELEVATIONS OF HUMEID FIELDS

In the field area to the east of Hajar bin Humeid and west of S1 several elevations were run on some of the higher field areas. Numerous buttes and small plateaus of silt had elevations of from 13.0 to 13.6 m., and there was at least one butte with an elevation of 14.2 m. (Plate 37). Since the tops of the sluices and drops in the secondary system around S1 had elevations of between 13.8 and 14.9 m., the fields that these irrigated when the system was abandoned probably had an elevation of about 14 m. Since the foundations of S12 were constructed at 13.8 m., it would seem that the area irrigated northeast of W10 probably also had an elevation of about 14 m. The area west of the canal between E10 and M15 apparently had an elevation of around 14 m., or perhaps a little more, since the tops of the sluices in this area had elevations of from 12 to 15 m. The foundations were not excavated, but they were probably from one half to one meter below the tops of the ruins.

The problem of the silt to the east of the canal section between the two mountain spurs (between E3A and E5) is extremely interesting (Plate 52). When the irrigation system was abandoned the whole area between the two spurs to the east of the canal had to be filled with silt. The peculiar shape of the part remaining today was caused by erosion from the lateral wadi

which first broke through on the north and then eroded away the back of the silt plateau (Plate 37). The highest silt on this plateau was 18.3 m. This area was protected by a gravel wash which apparently covered the silt during a particularly heavy rain. Along the mountain edge are to be found higher silt sections covered with scree, with elevations ranging from 18.7 to 19.9 m. Two irrigation ruins were found near the north and south mountain edges with top elevations of 19.0 (S4) and 19.1 m. (S3) as shown in Plate 37. Thus it is probable that the maximum elevation of this silt area was about 19.5 m., which would put this plateau about a meter above the hypothetical west wall of the canal.

The drainage of this silt plateau poses an interesting problem, since a sizable watershed is drained by this small wadi, to judge from the size of its present bed and from the amount of erosion this lateral drainage had produced in geological time. To analyze this problem, first assume that the east wall of the canal (at whatever stage it was) was higher than this enclosed silt plateau. When it rained, there would be a lake formed until the lake surface reached the banks of the canal. Then, unless some stonework was provided, the lake would drain into the canal and wash out the canal wall. It was probably in such a situation that E5 found service. As was shown above, before the Late Phases the canal was located farther to the west. With the canal passing farther west, E5 could have been located between the east wall of the canal and the mountain spur, and the water collected behind the canal wall could run out to the north, perhaps through the small sluice in E5 (Plates 37, 42), irrigating the area later irrigated by W10.

Gradually the area behind the canal must have become silted up to a point where it approached the height of the canal walls. It was then that the canal was probably moved slightly east either so that this drainage water could be drained into the canal, or more probably so that the water could be retained within the two spurs and the silt plateau used for cultivation. Once we arrive at a point where the silt plateau is above the bottom of the canal it is an easy matter to get the silt plateau up to the level of the top of the canal wall. One must assume that, when a lake was formed, it was not deep enough to flow over the

canal wall. Gradually alluvial deposits brought the level of the silt plateau up to the top of the canal wall. As the plateau approached the top of the canal walls, the walls would have to be increased in height. Accumulating water would gradually soak into the plateau or evaporate, completely depositing its load of sand and silt. Thus the silt plateau would build up until its elevation was considerably above the average top elevation of the canal. At this stage the whole irrigation system was abandoned.

There is evidence that the water either broke out or was let out from behind the retaining canal wall. Two areas of canal silt representing the east side of the canal were oriented in such a manner as to indicate a bulge in the canal side. These two areas, shown in Plate 37 as C1 and C2, had a top elevation of about 15.7 m. Such a bulge could have been formed by a washout breaking through the canal wall and eroding a temporary gully in the silt plateau. Then later silting-up of the canal would leave the evidence shown by C1 and C2. A washout here would not be serious, since the water would simply collect in the canal. In fact this may well have been the plan. A small *seil* was used to irrigate the silt plateau, while a large *seil* was used to irrigate other areas via the canal. After a break-through, the canal wall could be replaced with no serious damage done, since erosion could not proceed below the elevation of the canal bottom.

EVIDENCE OF ANCIENT FIELDS

It was while studying some oblique aerial photographs of Beihan taken by the Royal Air Force that I first noticed that vast areas of the Beihan silt appeared to have patterns of field plots laid out with amazing uniformity. Close examination of the photographs showed that there were apparently rectangular fields with their long axes perpendicular to the canal or primary water source which was irrigating the area. One of the largest of these field areas was at Khudreh. However, when I visited the Khudreh area to examine the "fields" I found that the area was covered with a vast number of silt

buttes, with wide erosion channels running in all directions, without any apparent orientation. I then climbed up a mountain to get perspective and saw that the erosion channels were identical with the lines that delineated the fields in the aerial photographs. It is also of interest to note that the erosion channels which ran perpendicular to the main canal were usually parallel to each other and ran straight from the canal to their end. The erosion channels that ran at right angles to those main channels were not in straight lines, but were at staggered intervals, so that the right-angle erosion channels were rarely continuous. The same pattern of parallel take-off channels from the main canals and staggered connecting channels was found on virtually every ancient silt area examined in Beihān. The term "rectangular erosion" will be used to describe this erosion phenomenon.

The widespread uniformity of the rectangular erosion seems to indicate that when the ancient systems fell into disuse there must have been ditches of some nature in which erosion could start. The ditches could have been formed by low banks of earth raised above field level or they could have been cut below the field area. If there had been earth walls, they would have washed away and left the level fields. It seems that only if the ditches were cut into the field levels could the final result have been so uniform.

Even in areas where ditches are not eroded, aerial photographs indicate the rectangular outline of the fields. When one travels over these areas on the ground there is no apparent difference in level, composition, or color. Such was the case with much of the Mablaqah silt, for one of the levelest sections of the auto road passed over this field area, where aerial photographs show definite field outlines. In the photographs the outlines of the fields appear darker around the lighter silt of the fields. It seems that the ditches must have filled with the blown sand which covers much of the area. Substantiating this is the fact that the darker lines on the level areas are about the same color in the photographs as definite eroded ditches, which also have a sand covering. There is a possibility that the darker lines may indicate the sandy composition of the secondary ditches, since the deposition in the ditches must have been different from that which occurred on the fields as the whole silt load was finally deposited. It should also be

noted that the sandy secondary ditches would be more susceptible to erosion, owing to their nature. Thus rectangular erosion proceeded effectively because there were apparently ditches, and because the bottoms of the ditches were composed of a sandy material that was easily eroded.

The ditches were probably relatively shallow so that they would conduct the main body of water away from the canal, and yet allow it eventually to flood the fields. The optimum ditch depth to accomplish this could only be determined by trial. Without the ditches the *seil* would have flowed across the fields in a few places and would not have been evenly dispersed. However, more important than water distribution was uniform silt deposition. Without such a system there would be an alluvial fan of silt where the *seil* emptied onto the fields from the primary system and decreased in velocity.

It should also be noted that the ditches could have been deep enough so that a *seil* would not necessarily flood the fields, but would surround the fields and be absorbed by the silt, thus watering whatever was growing on the silt. This "ditch theory" would seem to be substantiated by the discovery of actual ditches in the silt masses at various places. These survive in eroded silt masses only as dips in the otherwise level silt strata. Many of these dips were about a meter wide and about one-half of a meter deep. These apparently represented the tertiary channels. In only a few places were any of the ditches evident on the surface of the ancient fields. In these instances they were observed as shallow ditches several meters wide in areas where rectangular erosion was starting (Plate 58). In one area to the north of Hajar bin Humeid I was actually able to survey a limited number of these ditches as very shallow dips in the field level. These are shown in Plate 36 to the east of el-Henu. In one instance here I was able to trace tertiary channels dividing up one of the larger field areas.

The fields varied from 50 to 100 m. in width and were about twice as long. The most astounding fact about the fields is the uniformity with which they are laid out. All the main ditches in any one district appear to be parallel, regardless of any minor irregularities in the course of the main canal, or apparent confusion in the secondary distribution system. This is well shown by the Mablaqah area, where the main canal curves

in almost a quarter circle, but all the lateral distribution channels are parallel (Plate 36). This would seem to indicate that every ancient district was carefully planned and laid out with an accuracy that would be considered good by modern engineering standards. It seems that every season or so the secondary distribution ditches must have been plowed out; otherwise the fields and secondary channels alike would have eventually become level.

CONTINUATION OF THE HUMEID CANAL

The Hajar bin Humeid canal, which has been described in detail above, apparently continued for another 700 m. north past S23, the most northern sluice for which an elevation was determined (Plates 36, 37). The northern route of the canal is shown in Plate 36. The northern 700-m. section was drawn through a series of high irrigation ruins which apparently composed the primary system, although one ruin in the group may have been a house. None of these ruins was excavated. A group of ruins representing the secondary system lay off to the west. A tell representing an ancient town also lay to the west (Plate 36). Numerous inscribed Himyaritic stelae indicate that the village was contemporaneous with the ancient irrigation project.

Past the 700-m. north section of this canal there is apparently a gap, since another canal lies to the east, separated by a space of 300 m. (Plate 36). This section of the canal was traced for 110 m. from the large irrigation ruins. Although several of the ruins in the group of primary ruin heaps appeared to be houses, excavation might show that these are some type of water distributing devices. This branch of the canal probably served for the irrigation of the area contained in the hook formed by Tarat el-Aqeir. This area has very little natural runoff, i.e. the mountain edge bordering it is simply the bottom of a low spur. Only one small wadi runs out of the southwest corner of the loop.

The area to the northwest of this canal (enclosed within the dotted lines in Plate 36) con-

tained a large number of rather high irrigation ruins which were not surveyed. Just north of this area was a scarp of more than 10 m., relatively sharp in some places, gentle in others. This scarp marked the northern limit of the intensive ancient irrigation on the east side of the present Wadi Beihān bed. Why the ancients irrigated no farther north on the east side of the main wadi bed will be explained below.

It is assumed that the 1900-m. section of the Hajar bin Humeid canal joined the 1100-m. section which was displaced 300 m. to the east. However, nothing has yet been said about the water supply for the area bordering the northern scarp (enclosed within the dotted lines of Plate 36). Around the projecting spur of Tarat el-Aqeir is Wadi Farā, a wadi of considerable magnitude flowing out of a spacious rocky canyon. In ancient times the Qatabanians forced Wadi Farā westward along the mountain spur of Tarat el-Aqeir, and with it irrigated the area within the dotted lines (which will be called Wadi Farā silt).

Today Wadi Farā flows about 7 km. northwest before it reaches the main Wadi Beihān bed. Only a very small part of the flow of Wadi Farā is diverted to the west to irrigate an *zib* orchard known as Dirneh (Plate 36). Even today it is not difficult to see that with a little more construction the whole Wadi Farā could be made to flow along the mountain spur. There is a very level plain north of Tarat el-Aqeir and the Wadi Farā silt, with irrigation ruins scattered at wide intervals up to 500 m. away. This level plain extends about a kilometer north from Tarat el-Aqeir before it is more or less covered with sand dunes.

As one goes north from Tarat el-Aqeir, the mountain range on the east side of the Wadi Beihān becomes lower and lower until it disappears abruptly under the northern sands. As the elevation decreases, the width of the river decreases (there is another wadi just to the east and parallel to the Wadi Beihān), so that the drainage from the mountain continues down hill as one goes north. There are only a few small wadis leaving the range north of Tarat el-Aqeir (Plate 37), so that Wadi Farā is the last sizable wadi on the east side of the main valley as one goes north. It is not surprising that the ancients did not find the north end of their land east of the river north of Tarat el-Aqeir.

north of Taraf el-Aqeir: water was no longer available in sufficient quantities.

ANCIENT SILT IN OTHER AREAS OF BEIHÂN

Mablaqah Silt

Another area where there were considerable irrigation ruins was surveyed to the west of Hajar bin Humeid and the main Wadi Beihân. This is the area once irrigated by the north branch of the Wadi Mablaqah. I surveyed on the ground a section of the high irrigation ruins representing the primary canal and a short line of sluices in the secondary system to the west of the main canal. I did not run any levels on these works. After I left Beihân I received a set of very clear vertical aerial photographs of the area taken by the Royal Air Force. These actually show more of the nature of the irrigation pattern of the Mablaqah area than I learned from many days on the ground.

I made a map of the area from the aerial photographs. The secondary channels showed as slightly darker lines (Plate 60). The irrigation ruins appeared as small dark dots. When I completed the map from the aerial photographs the irrigation ruins that are visible from the air corresponded exactly with those I had surveyed on the ground. This map is incorporated in Plate 36. As was mentioned above, the auto route passed through the middle of this vast silt plain. This section of the road was one of the levelest in the whole of Beihân. Never did I see on the ground any evidence of these secondary channels. The fact that the Mablaqah silt is so level in places shows that there has been a minimum of erosion here. Only on the east and west edges has erosion made any appreciable dent in the silt.

The main Mablaqah canal comes in from the west and then swings gently to the north (Plate 36). It is interesting to note that at the start the irrigated area lies to the mountain side of the canal. Even in the lower part of the canal the majority of the irrigated area is to the west of

the canal. The really amazing thing about the ancient irrigation system at Mablaqah is the fact that all the east-west channels are parallel, regardless of the course of the main distribution canal. The map of the Mablaqah silt seems to indicate that over part of its course the main canal ran right on the edge of the silt scarp bordering the Wadi Beihân. Actually it seems that the main wadi has removed some of the silt to the east of the canal along this exposed section.

The fact that a large part of the Mablaqah silt was irrigated from the main canal towards the mountains on the west would seem to indicate that in ancient times there was a gradient sloping from the canal to the mountain edge, just the opposite of the natural drainage in effect before irrigation was started. That the silt mass left by centuries of irrigation actually had a gradient sloping towards the mountain is substantiated by the peculiar course the north branch of the Wadi Mablaqah takes today. Rather than breaking through to the east and meeting the Wadi Beihân directly, it follows the mountain north for about 4 km. before it swings east to join the Wadi Beihân (Plates 35, 36).

Warikheh Silt

Wadi Mablaqah would only have followed such a strange course if there were a higher mass of soil acting as a natural barrier to keep it from flowing directly into the main Wadi Beihân. The fact that this branch of the Wadi Mablaqah broke through where it did on the north gives important evidence as to the original shape of the mass of silt north of the Mablaqah silt. It must have been higher than the Mablaqah silt at the junction of the two to force the Wadi Mablaqah finally to the east. The fact that the wadi which was used to irrigate this next area—the Wadi Warikheh—follows the same peculiar course that the north branch of the Wadi Mablaqah did (Plate 35) shows that it too probably flowed in a central canal irrigating the land towards the mountains.

There was apparently a lower level field area to the east of the Warikheh silt, since there was a scarp between the larger level area near the mountains and the smaller area near the main

Wadi Beihān. Wadi Warikheh never does reach the main wadi, but is simply lost in the sands to the west of the Nuqūb air strip (Plate 35).

Nuqūb Silt

There was apparently ancient irrigation carried out farther north of the Warikheh silt, since there were buttes of silt, some representing a canal, north of the Nuqūb air strip, and there were irrigation ruins just south of Hajar Kohlān. Wadi Warikheh could have been conducted into a canal to serve this end (Plate 35).

Suqqut el-Milḥ Silt

Going still farther north there is evidence of field plots buried beneath the massive sand dunes just east of the Suqqut el-Milḥ air strip. Water for irrigation this far north and so far west of the main wadi must have come from Wadi ed-Daqiq (Plate 35).

Ṣafḥet ed-Dahwal Silt

South of the Mablaqah silt is a low area known as Ṣafḥet ed-Dahwal that was apparently irrigated by the south branch of the Wadi Mablaqah or by a small wadi coming from farther south, or more probably by both. Both these wadies now follow unnatural courses similar to those of the north branch of Wadi Mablaqah and Wadi Warikheh and these courses may be explained in exactly the same manner as Mablaqah. South of this low field area there is a conspicuous lack of ancient silt on the west side of the main wadi until one travels some distance up Wadi Khīr.

Jebel Khuḍreh Silt

Just south of the Hajar bin Homaid canal system is a large area of ancient irrigation silt

surrounding Jebel Khuḍreh (Plate 35). Several data indicate that a canal ran almost parallel to the present Wadi Beihān bed, virtually on the outside western edge of the Khuḍreh silt mass, and that the flow of irrigation water was towards the mountains, the reverse of the natural drainage in effect before irrigation was started. Just as in the cases of Wadi Mablaqah and Wadi Warikheh, when the system was abandoned Wadi Ḥamad was forced to follow an unnatural course close to the mountain edge until it broke out into the main wadi (Plate 35). Besides this, erosion of the Khuḍreh silt area has proceeded uniformly from northwest to southeast, from the main wadi bed towards the mountains, draining into Wadi Ḥamad. These two facts indicate quite clearly that the silt sloped from the main wadi towards the mountains, and thus that irrigation was carried out in the same direction. Only at the extreme western edge of this silt has erosion proceeded towards the main wadi (Plate 61).

The canal which ran along the western edge of the Khuḍreh silt apparently passed to the west of Heid el-Qarnein, and probably obtained its water supply from the bed of the present Wadi Khīr, as we shall see below. We should not conclude here that all the water for the Khuḍreh area in ancient times came from the Heid el-Qarnein canal, for obviously the water from Wadi Ḥamad and several other small wadies coming off the mountains had to disgorge into the Khuḍreh silt. It would appear that Wadi Ḥamad irrigated the area to the southwest of Jebel Khuḍreh, and that the Heid el-Qarnein canal handled most of the area to the northwest of Khuḍreh. This would seem to be supported by the fact that a wall extended from Jebel Khuḍreh eastward towards Jebel Murjāh, although the portion crossing Wadi Ḥamad is now completely washed out. This was obviously a dam to hold the water of Wadi Ḥamad until it deposited its silt. On the east side of Wadi Ḥamad one of the larger blocks of this structure carried a very elaborate inscription (see below). This dam was the only one I saw in Beihan for the purpose of irrigation. (There were small ancient dams in the mountains forming cisterns for collecting drink ing water.)

C. Lundberg wrote an extraordinarily accurate geographical account of Beihan and Ḥanib in 1937, an extended questionnaire of natives from the

two districts in Aden.³ Yet most of the extensive ruins of cities and villages he mentions in Beiḥān and Ḥarib are actually only irrigation ruins, which his informants mistook for the ruins of ancient houses. Landberg is to be excused, since he was only reporting what he had been told by the natives, and in fact is to be complimented on being able to get so much geographical material in this manner, for the relative locations of the places he mentions are fairly accurate. The ancient irrigation works were so well built that the natives did not associate them with irrigation, but thought they were houses. So much has irrigation construction deteriorated in the last 1500 years!

Landberg thought that the irrigation ruins of the Khuḍreh area represented extensive cities and classed them as the most important ruins in the whole country.⁴ He states that at the foot of Jebel Khuḍreh there were the ruins of two cities and that the east city was surrounded by a great wall. The "east city" is simply the ruins of irrigation works and the "wall" is the ancient dam across the Wadi Ḥamad. I did examine some ruins at the south foot of Jebel Khuḍreh which appeared to be the walls of houses, and yet these, too, may be water-distributing structures similar to those common at Mārib.

Water Source for Humeid Canal

While the Hajar bin Ḥumeid canal has been discussed in detail, its water source has not yet been considered. Plate 37 shows that at its southern extremity the canal apparently bends to the east as if to follow the mountain. Water could be supplied from two sources: from a continuation of the Khuḍreh canal mentioned above or from the Wadi Ḥamad. Theoretically either is possible, but from a practical point of view the Hajar bin Ḥumeid canal must have received its water from the Khuḍreh canal.

In the first place Wadi Ḥamad was not actually as big as its present bed suggests, for as was shown above, most of the Khuḍreh silt now acts as a watershed and drains into Wadi Ḥamad. Even with this water Wadi Ḥamad would proba-

bly not be big enough to supply all that was required by the Hajar bin Ḥumeid canal. In the second place, if the Wadi Khirr actually did feed the Khuḍreh canal, there would be more than enough water for the Khuḍreh area. Finally, there was a dam across Wadi Ḥamad. Thus it seems logical to suppose that the Khuḍreh canal joined and fed the Hajar bin Ḥumeid canal. Whatever evidence might once have been present at the junction of the two was destroyed when Wadi Ḥamad broke through. Today several hundred meters separate the two areas, and there is about a 10-m. drop from the Hajar bin Ḥumeid silt to the present Wadi Ḥamad bed at this point.

Jebel Khalbas Silt

An interesting little area of ancient silt is found stretching for 3.5 km. along the mountain edge between Jebel Khalbas and Ḥeid el-Qarnein (Plates 62, 6-f). The strip is only about 300 m. wide, except at the Khalbas end where it widens to about 700 m. This Khalbas silt forms a plateau 7 to 8 m. above a lower level of silt. Apparently the Khalbas silt functioned much the same as the mountain-locked silt plateau to the east of the Hajar bin Ḥumeid canal: all the *seil* was kept within the area by means of an earthen wall along the outside edge of the silt, periodically forming a lake over the silt. This same practice is used today in certain places on small wadies, the earthen wall acting as a dam, just as the dam across Wadi Ḥamad must have done in ancient times. Since there are several large lateral wadies running off the mountain slopes between Khalbas and Ḥeid el-Qarnein, it was found desirable to construct a canal along the mountain edge for uniform distribution of the water. Without such a canal, large gullies would have poured the water and its load of coarse sediment down on one spot and would probably have washed out the outside wall. Since the system was abandoned the small lateral gullies have produced severe rectangular erosion in the area. The canal began near Ḥeid el-Qarnein and consisted mainly of small angle sluices very similar to S26 (Plate 43), but reversed. The sluices were located every 100 to 200 m. along the mountain edge. The reconstruction shown in the lower part of Plate 64 is based on aerial surveys and

³ C. Landberg, *Arabica* (Leiden, 1898), v.

⁴ *Ibid.*, pp. 21, 37.

ground reconnaissance. The sluices may not be located in exactly the correct place, but they are approximately correct over the distance shown.

Most of the construction corresponded to that found in the Late Phases of the Hajar bin Humeid canal, consisting of small wedge blocks. At its beginning, near Heid el-Qarnein, the canal was only 8 to 10 m. wide, but it increased slightly in width as it ran north. In most instances the tops of the irrigation ruins were about level with or only slightly above the top of the silt plateau, so that when this system was abandoned the sluices were nearly buried. A few wells located in the area indicate that well irrigation was carried on in addition to *seil* irrigation. The wells varied from 2.7 to 2.9 m. in diameter. It should be noted that the Khalbas silt area was a unit in itself, utilizing only its own water supply and apparently giving up none of it. Just south of Jebel Khalbas there are some extensive ruins of houses in late Himyaritic style on a small rock outcrop within the area of silt.

Landberg mentions the ruins of houses at el-Wasi'ah and es-Sijn.⁵ The ruins at Jebel el-Wasi'ah near Heid el-Qarnein are definitely irrigation ruins, but I am not able to locate es-Sijn, although from Landberg's description it is evident that it is somewhere between Jebel Khalbas and Heid el-Qarnein. Perhaps these are the ruins of the houses just south of Jebel Khalbas.

It has been pointed out that the Khalbas silt forms a plateau 7 to 8 m. above a lower level of silt. This lower level was probably irrigated by the start of the Khudreh-Hajar bin Humeid canal. At the start of the canal by Heid el-Qarnein, this lower silt is only 3 or 4 m. above the Wadi Beihān bed, but the height of the scarp increases rapidly as one goes north so that near Khudreh it is close to 15 m. high (Plate 61).

Sa'id Silt

Southeast of Heid el-Qarnein lies the Wadi Sa'id silt area. While I did not visit this area, it apparently received all of its water from the Wadi Sa'id and another more southerly wadi coming from the eastern loop in the mountain. The map of the area shown in Plate 63 has been constructed from vertical aerial photographs

(Plate 63), from oblique aerial photographs taken from the west, and from the outline of the Heybroek-Groom map. Not enough data are at hand to tell where the main canal ran. Today this area shows evidence of severe rectangular erosion. This Sa'id silt is the vast plain which Landberg states is "littéralement couverte de sites antiques."⁶ Very likely many of these ruins which Landberg refers to are irrigation ruins.

Hadaqeh Silt

South of the Sa'id silt area there is apparently an accumulation of silt along the mountain edge for about 4 km. (Plate 35). This is the area north of Hadaqeh where Landberg states there are "grandes ruines avec beaucoup d'inscriptions."⁷ I did not visit this silt either, but it appears that it probably received much of its water from Wadi Nahr, in addition to what the mountains behind may have provided.

Jidfar Silt

There is much elevated silt on the west side of the Wadi Beihān bed just west of the Hadaqeh area (Plate 35). This silt extends from Beihān el-Qaṣāb south to around Hadaqeh (which is across the main wadi). It is in this area that Landberg mentions the ruins of an ancient town outside Jidfareh, the ruins of five ancient towns north of Jidfareh in an area known as el-Meineh, and the ruins of five ancient towns at es-Sadat farther north.⁸ The majority of these ruins are actually those of irrigation works, some of which I examined. This area probably received water from Wadi Ghabar el-Asfāl as well as from the mountains behind. Landberg's Jidfareh is very probably Jidfar.

Hanajeh Silt

Going farther south on this western silt plain one comes to the high scarp of what may be

⁵ R.I., p. 35.

⁶ R.I., p. 12.

⁷ R.I., p. 22.

called the Ḥarajeh silt, which probably received its water from Wadi Ghabar el-A'la (Plate 35). The silt plateau formed in the Ḥarajeh area by the water from the Wadi Ghabar el-A'la is very unusual. Southeast of Ḥarajeh there is evidence that a village may have been buried in the silt, since erosion has exposed whole walls of buildings covered with many meters of silt. The irrigation works visible in the Ḥarajeh silt appear in general to be entirely different from those found elsewhere in the Beihân area. However, this may have been due simply to the fact that large flat stones were available nearby as the result of natural weathering. Most of the Ḥarajeh irrigation works I examined were of the step-type construction, made of such stones. There were many sluices, but usually of a different type than otherwise seen in Beihân.

South of this Ḥarajeh silt there is apparently no ancient silt in either Wadi Naḥr or Wadi Ghabar. The Ḥarajeh silt is the thickest deposit of ancient silt in Beihân. Yet, one should not draw the hasty conclusion that this area was cultivated for the longest period of time, for the fact can also be explained by assuming that the area received more water (and thus more silt) per acre than the other areas.

Landberg reported that in the Ḥarajeh area there were the ruins of a "grande ville nommée Maryama."⁹ He immediately concluded that this ruined city of Maryama with its extensive ruins must be the city of Marsiaba which, according to Strabo, Aelius Gallus reached in 24 b.c. Other classical writers had spelled the name "Mariaba," and scholars (with the exception of Landberg and those who follow him) agree that Marsiaba = Mariaba (Mariba of Augustus) = modern Mârib, which is known in the inscriptions as "Maryab." Today Maryamah is the name of a modern village of a few houses which is in the area of the Ḥarajeh irrigation ruins. The only ruined buildings evident are the few houses mentioned above which were apparently buried under the silt, and a few houses on a spur overlooking the area. Thus there is no reason to believe that Maryamah has any connection with Marsiaba or Mariaba. It seems certain that the classical writers must have been referring to Mârib.

Wadi Khirr Branch

The most westerly of the main tributaries of the Wadi Beihân is Wadi Khirr. While I did not travel up this branch, some oblique aerial photographs taken from the west by the Royal Air Force show that there are three small areas of ancient silt along the Wadi Khirr south of Jebel Reidân (Plate 35). Since these areas are certainly not extensive enough to use up the waters of Wadi Khirr, it seems that the latter must have been deflected to the east near Ḥeid el-Qarnein to irrigate the Khuḍreh-Hajar bin Ḫumeid areas. If this were true, and if all these projects were in operation at the same time, there would have been little water in the main Wadi Beihân bed in ancient times after rain. All the *seils* of all the major individual tributaries would have been evenly dispersed over the field areas. However, there is no proof that all these projects were in operation at the same time.

WADI HARIB

Beihân is undoubtedly the longest valley running north out of the South Arabian mountain massif. To the west of Beihân is the smaller but wider valley of Harib, which I did not have a chance to visit. There are extensive Himyaritic ruins in Harib, many of them still standing to a considerable height. This is in vivid contrast to Beihân, where I saw only a few Himyaritic buildings projecting to any distance above the ground. There are also irrigation ruins and silt deposits in Harib, and it seems logical to suppose that ancient irrigation in Harib resembled its counterpart in Beihân.

From a comparison of Landberg's description of Beihân with actual observations in the field, it can easily be seen that the same mistake was made in some cases in Landberg's description of Harib. However, Landberg's informants actually realized that some of the Harib ruins they described were irrigation structures, for he states that the plain between Wadi Maqîl and Wadi 'Ain (actually Harib) stretching to Darb al-zibî Tuhîf was covered with ancient wells, ditches,

⁹ *Ibid.*, pp. 21-22.

and buried palm trunks.¹⁰ In the middle of this plain and just north of a small isolated mountain known as Jebel Qarn 'Obeid there is an extensive tell known as Hajar Ḫenu. This is actually the ruins of a large city.

Landberg reports further that an hour (by camel) north of Darb āl abū Tuheif and two hours south of el-Qarn at the junction of Wadi Ablāḥ and Wadi Ḥarib is to be found an ancient site known as Hajar Ḥarib on the east bank of the wadi.¹¹ The name would definitely seem to indicate that the site was that of an ancient city, but Landberg's statement that "c'est un vaste champ couvert de ruines himyarites" would strongly suggest irrigation ruins, with perhaps a tell in the neighborhood by which the now deserted area is known. Landberg also records what must be irrigation ruins in the area watered by Wadi Ablāḥ southwest of Jebel Hashfah, for the area is "littéralement parsemée de ruines."¹²

Along the mountain edge between Ḥarib and Beīḥān there is one sizable wadi leaving the mountain mass, the Wadi Dhahabah. In the delta of this wadi I found a tell about 100 m. in diameter and about 3 or 4 m. high; this ruin is known as Hajar Dhahabah. Scattered around this delta are low mounds which may represent irrigation ruins.

EVIDENCE OF CULTIVATION

In dozens of places on the ancient silt fields in Beīḥān I located strange discolored circles on the flat silt surfaces (Plates 59, 67-69). These were sometimes found evenly spaced in both directions. At other times they were arranged in rows, with the circles at varying distances apart in each row (Plate 59). The centers of the circles were usually about 3 m. apart in any direction, varying slightly from place to place. While the circles were sometimes just dark spots 30 to 50 cm. in diameter (Plate 59), there were usually concentric rings surrounding the dark center (Plate 67).

¹⁰ *PLA*, p. 16.

¹¹ *PLA*, p. 164.

¹² *PLA*, pp. 167-169.

One expert who kindly read this manuscript before publication has suggested that I should have dug and sampled the circular discolored areas. He suggests that they might be filled-in, shallow, temporary wells for supplementary water for the fields. Actually I did dig into many of these discolored circles, but once the surface of the dried silt was broken, the discoloration was practically impossible to detect, and thus sampling was impractical. The only arguments I can offer against the shallow well theory is the fact that there were so many of the circles that it would be virtually impossible to dig all the holes after every *seil*, and also the fact that some of the circles were so small (30 cm. in diameter).

Today in Hadhramaut date palms are planted in straight lines, each in a dug-out circle of its own. It seems probable that the mud circles in Beīḥān reflect the position of some ancient tree or bush that was cultivated. Although some of the photographs seem to indicate that there are circular pits around the circles, the ground is actually very level. It might be suggested that the discoloration was due to selective leaching of the soil, or to the addition of some sort of fertilizer around the trees discoloring the soil, or to old trunks rotting out and the holes filling in with sand. Since there are a few date palms in Beīḥān today, there is no reason why some of the circles could not represent ancient date palms. We have seen above that Landberg reported buried palm trunks in Ḥarib.

Since previously known Himyaritic inscriptions make frequent mention of 'elb plantations in South Arabia, I first assumed that the circles in the mud must somehow reflect the position of ancient 'elb trees (*Zizyphus Spina-Christi*, Willd.) which produce the *dōm* fruit, small cherry size fruit of apple consistency. Today there are numerous orchards of 'elb trees in Beīḥān (Plate 70), but in the valley probably half of the fruit from these trees is left to rot on the ground (the Bed Ḥirith collect the fruit more meticulously). In view of this fact, it is difficult to see what use the ancients would have had for thousands of additional acres of 'elb trees. Besides this fact, the 'elb tree actually grows too large to fit into the space allotments of most of the mud circles if the trees were left to mature. This applies to the date palm as well.

Thus, assuming that the majority of the mud circles do not represent either ancient 'elb trees

or date palms, we must look for some other tree. Since there is no other tree cultivated today, we are led to one that might have been cultivated in ancient times. This leads us logically to incense trees. It would seem that the discoloration of the mud circles might be due to a concentration of insoluble resin from some sort of incense tree. Why there is such a variety of concentric patterns is not evident. It may be that they are derived from the incense in the roots after the roots rotted, although the mechanism by which the resin worked its way to the surface is not apparent. Incense is a term used to cover frankincense and myrrh, as well as some other, less well known, resinous gums. Frankincense (old French: *franc*, "free, pure"; *encens*, "incense") is a fragrant gum resin containing a volatile oil, while myrrh (Arabic: *mirr*, "bitter") is an aromatic gum-resin with a bitter taste. Frankincense is used mainly for burning, but is also used as a masticatory and for medicinal purposes. Myrrh was used by the ancients as an unguent, in perfumes, and for burning. It was myrrh that was used by the Egyptians in embalming, not frankincense.

Today frankincense is found growing wild in Somali country in East Africa, and in the Dhofar coastal region of South Arabia. Thomas states that frankincense is found growing just over the mountain divide in the Qara mountains between 610 m. and 760 m. (estimated by aneroid barometer), in an area which happens to be identical with the territorial limits of the Qara tribe.¹² Thomas suggests that its occurrence on the edge of the unique summer rain belt of Dhofar indicates that climatic conditions favorable for its growth exist nowhere else in the Arabian peninsula.

This area roughly corresponds to the location of the frankincense region as described by Pliny:

[An] eight days' journey from Sabota [Shabwa] is a frankincense-producing district belonging to the Sabaei called Sariba. . . . The region faces north-east, and is surrounded by impene- trable rocks, and on the right hand side bor- dered by a seacoast with inaccessible cliffs.¹³

While this description is generally reliable, it must not be taken as the precise location of the frankincense district, owing to the fact that it is

based on information given Pliny by informants who may have been deliberately vague and obscure in order to conceal the actual location of the forests from the Romans. That the Arabs were intentionally secretive in discussing the source of frankincense is implied by Pliny who, in seeking an accurate description of a frankincense tree, states:

The ambassadors who have come to Rome from Arabia in my time have made all these matters still more uncertain, which may well surprise us, seeing that even some sprigs of the incense-tree find their way to Rome . . .¹⁴

Although some writers have identified the frankincense area described by Pliny with the Wadi Hadhramaut on the basis of the topographic resemblance, this identification is certainly wrong. The most distant point in the Wadi Hadhramaut is hardly an eight days' journey from Shabwa, suggesting that the area was farther east. More important, however, is the fact that the monsoon rains do not fall in Hadhramaut as they do in Dhofar, making it improbable that frankincense was grown there at all. Pliny's "frankincense-producing district," therefore, must have been located beyond Wadi Hadhramaut and Wadi Masila in the general Dhofar region where it continues to flourish.

Thomas relates that the Qara tribe, in whose territory the incense trees are found, are herdsmen and rent the incense forests to the neighboring Kathiri and Mashayikh to harvest in return for half the produce. The harvest is carried out in the summer months, but during the rains of July and August the trees are left alone.¹⁵

Bent states that the incense is gathered in the hot season when the gum flows most freely.¹⁶ This seems to agree with Pliny who states that "the earlier and natural gathering takes place . . . when the summer heat is most intense."¹⁷ The incense is usually stored in caves until winter, for during the southwest monsoon there are gales and storms off the Dhofar coast which make the use of dhows impractical.

The collectors make slight incisions in the stout branches and the trunk. After a week or ten days the "tears" of frankincense have become large enough to remove. After the gum has

¹² B. Thomas, *Arabia Felix* (London, 1932), p. 123.

¹³ B. Thomas, *op. cit.*, p. 123.

¹⁴ T. Bent, *Southern Arabia* (London, 1900), pp. 252-54.

¹⁵ Pliny, *op. cit.*, 12: 52.

¹⁶ B. Thomas, *Natural History*, translated by H. Rackham (Loeb Classical Library, London, 1935), 12: 30.

been removed the incision is deepened and another collection can be made in a week or ten days. This process goes on for five months or so, until the tree dries up. Then it must be left to recover, the recovery period varying from six months to two years, according to Thomas. Bent relates that myrrh trees also grow in the Dhofār region, in close proximity to frankincense trees. He relates that the gum of the myrrh tree is reddish, while that of the frankincense tree is considerably whiter.

Thomas describes the frankincense tree as a clump of branches with no central trunk, growing to a camel's height. The tree has ash-colored bark and tiny crumpled leaves. In contrast, the myrrh tree has a definite trunk and branches, and a thorny appearance from a distance. To the best of my knowledge, frankincense trees have not been found in Arabia outside of Dhofār. On the other hand, myrrh trees are apparently scattered all over South Arabia, usually in the high hills and mountains. We have already seen above that Bent found myrrh trees growing at the same elevation as the frankincense trees in Dhofār.

Mrs. Ingams reports that there are still "intense trees" growing in Hajar Province.¹² One place she mentions is near Wadi Mardaha (at an elevation of about 790 m.). Another is at Bana in Wadi Bana, where she was told that intense trees were plentiful in the hills. This would be somewhere between the wadi level of 240 m. and the plateau height of about 920 m. in the area. Van der Meulen shows a picture of a myrrh tree in the mountain country north of Dathina and the Talḥ pass, probably about 1500 m.¹³ In Beihān I located a tree that must have been myrrh growing in a rocky ravine between 900 m. and 1200 m. The gum of the tree was reddish colored.

Thus the evidence seems to indicate that frankincense trees grow wild in Arabia (Dhofār) at elevations from 600 to 700 m. and that myrrh trees grow wild in Arabia from about 600 to 1500 m. It seems probable that in ancient times frankincense was grown in Arabia only in the Dhofār region. But Pliny lists seven types of

myrrh from as many districts in Arabia. One of these was the Minaean myrrh, which included "the Astramitic, Gebbanitic and Ausaritic from the kingdom of the Gebbanitae [Qatabanians]."¹⁴ Since there is no positive evidence that ancient Qatabān proper included more than Wadi Beihān and Wadi Ḥarib, it seems logical to suppose that myrrh was grown in ancient Beihān, and that indeed, the mud circles found so frequently on the ancient field levels actually represent the "Gebbanitic" myrrh groves.

To support this we have Strabo's account of Aelius Gallus' invasion of South Arabia in 21 b.c.¹⁵ After a toilsome march Gallus reached "Negran . . . a country which was both peaceable and fertile."¹⁶ This can be none other than the fertile oasis of Nejrān. The city fell to a single attack. A march of six days brought the Romans to "the river." This was probably Wadi Khirid, today the only perennial river in the area and the bulwark of agriculture in Jaus. In a battle at the river the Romans slew no fewer than 10,000 of the enemy, losing only two of their own men, according to Strabo. The Romans then took the cities of Asca and Athrula. After collecting grain and dates, Gallus continued on to Marsiaba, which he besieged for six days. The siege was raised because of a scarcity of water, and the expedition turned back there. Most scholars have assumed that Strabo's Marsiaba—the classical Mariaba = modern Marib (known in Himyaritic inscriptions as "Maryab"). Gallus' prisoners told him that he was "two days' journey from the country that produced aromatics."¹⁷

While most scholars have accepted the supposition that Gallus reached Marib, they have all doubted the statement that he was only two days' journey from the "country that produced aromatics," because they unnecessarily assumed that this meant Hadhramaut. However, since Beihān is only about 65 km. from Marib, and since it seems probable that there were extensive groves of myrrh in Beihān in ancient times, Gallus was actually two days' from an extensive aromatic area. This would seem to indicate that there

¹² Mrs. H. Ingams, "Excursion into Hajar Province of Hadhramaut," *Geographical Journal*, 53 (1918), pp. 129, 132.

¹³ D. van der Meulen, *Aden to the Hadhramaut* (London, 1915), Pl. 22.

¹⁴ Pliny, *op. cit.*, 12. 35.

¹⁵ *The Geography of Strabo*, translated by H. L. Jones, Early Classical Library, London, 1912, Vol. 12, p. 244.

¹⁶ *Ibid.*, 16. 1. 4.

¹⁷ *Ibid.*, 16. 1. 24.

was no incense grown at Mārib, since it would seem that if there were, it would certainly have been mentioned.

GENERAL PATTERNS OF ANCIENT IRRIGATION

We have as a final picture of the method of ancient irrigation a system of primary canals and sluices for transporting the *seil* and bringing it down to a field level, with secondary irrigation works for dividing the water and distributing it by means of parallel ditches cut into the fields with staggered connecting ditches (Plates 3b, 61). A *seil* was thus completely dispersed over the field areas. Every sluice that I saw or uncovered had its exit wide open. Never did I see any grooves for boards or sluice gates in the exits of the sluices.

There is evidence that the exits of some of the sluices were changed to regulate the flow of water through the sluice when more or less water was needed in any area, but these were permanent changes, and these altered exits were also left wide open. We have seen that the sluice openings were periodically raised when the canal bottom became silted up to near the elevation of the previous openings. The ancient technique seems to have been to distribute the *seil* as rapidly and as efficiently as possible. Once the *seil* was broken up into numerous small streams its power was lost. It would seem that the canals must have had spillways to let out any abnormally large *seil* that threatened to destroy the canal without washing the canal walls out. Likewise, there must have been overflows on the fields to release any water that would threaten to break down any other part of the system.

Nowhere in Beīlān did I find a dam whose purpose was to store water for future or controlled irrigation use. As a matter of fact the only dam that I identified as such was the low (1.5 m. high) structure in the Khuḍreh area which was used for stopping the waters of Wadi Ḥamad. There was a small section of this dam on the east side of Wadi Ḥamad, and a longer section on the west side of the wadi. The east

section was simply a mound of hard silt faced on the upstream side with rocks embedded into the silt. It was near this short section of dam that two inscriptions were discovered on a row of massive red quartzite blocks which were evidently part of an overflow or a ruined sluice (Plates 75, 76). The larger inscription was dated about the fourth century B.C. by A. Jamme (see Appendix III). The portion of the dam on the west of the wadi consisted of a mound of silt with a wall projecting from the top. It is interesting to note that the east end of this dam with its upstream facing of rocks is identical with part of the famous Mārib dam (which will be discussed below).

Hamilton reports the ruins of a dam near Beīlān el-Qayib,²³ but I did not discover any structure in that area whose function was that of damming water. I did locate some ruins that were simply drops, and these could have been mistaken for parts of dams. Apparently the ancients learned the difficulties of attempting to dam a desert *seil* and devised a system whereby they dispersed a *seil* and its silt load as rapidly and as uniformly as possible. The area behind any dam would rapidly silt up, thus making continued use impossible.

ANCIENT WELL IRRIGATION

The discovery of numerous wells on the ancient silt areas shows that the ancients did not depend entirely upon *seil* irrigation (Plate 71). It would seem that they may have developed a vast water-storage system, in which their silt fields absorbed the water that soaked through like great sponges, so that it could be easily raised from shallow wells. As the primary source was rain water it would not contain salts other than those that were dissolved from the silt washed from the hills. It would seem that this "sponge effect" may have existed, since some of the wells I located on the ancient field areas

²³ R. A. B. Hamilton, "Archaeological Sites in the Western Aden Protectorate," *Geographical Journal*, 101 (1943), p. 116.

could only have received water from the silt, as they were very close to the mountain edge. Such is the case of the Khalbas silt.

As the *seil* travels down the wadies today, it sinks rapidly into the sand and gravel of the wadi beds, so that wells of four to six fathoms built at wadi level are necessary to recover the water. Thus by flooding their fields with the *seil*, the ancients may have accomplished a dual purpose, making it easy to recover the water from wells after it was absorbed by the silt.

The ancient Qatabanians developed what may be called an "irrigation spout" for the final distribution of well irrigation water (Plates 72, 73). Broken pieces of these spouts were found scattered around the ancient fields in Beihān. In the silt plateau east of Hajar bin Ḥumeid are the ruins of a house (Plate 37), and a number of weathered irrigation spouts were found around this house (with foundations at 14.5 m.) and in other places in this silt plateau at about the same elevation. G. W. Van Beek informs me that similar spouts appear in various strata between levels 11.20 m. and 17.65 m. at Hajar bin Ḥumeid. These spouts, all made of pottery, were probably fashioned in the following manner. The potter worked the clay into a flat, oval-shaped pad somewhat larger than the size of his hand. Then placing the palm and fingers of one hand on top of the clay, he folded the overhanging clay on each side of the palm of his hand to form two vertical parallel sides. On many examples, the finger impressions of the potter are still visible. The manufacture of such spouts illustrates the high organization of agriculture in ancient Qatabān. To the best of my knowledge, this is the first time this type of utensil has been reported from any part of the world. Today farmers in South Arabia have to make a small sluice of three stones to let the water from the small supply ditch into a field area. The Qatabanian had only to push his spout down into the mud wall of the supply ditch and the water flowed. The modern Beihānis were enchanted by this ingenious device!

Occasionally one finds what appears to be the furrows of fields on the silt areas (Plate 69). This shows that the ancients must have had some sort of plow for breaking up the soil

DATING

The precise dating of an irrigation system is always a lengthy, and usually an unsatisfactory, task. Under peaceful conditions there is constant repair and rebuilding, as well as new construction. Older work is incorporated into new, and the origins of the system become buried under tons of sediment. The problem is increased enormously when the system has been used for many centuries, for shifts in cultivation or temporary abandonment may at first make the older appear newer.

It is difficult with the evidence at hand to tell definitely whether or not all the ancient field areas of Beihān were contemporary, since there is a disappointing lack of inscriptions on the irrigation works. In contrast to the massive irrigation works of the Mārib dam, which (as we shall see later) was literally covered with inscriptions, the Beihān irrigation works were characterized by a lack of inscriptions; I found only three inscriptions on the hundreds of irrigation works I examined in Beihān.

While there is no evidence actually proving that the ancient irrigation ruins scattered all over Beihān were not contemporary, there is no reason to believe that they were. However, it is interesting to note that, with the exception of the Harajeh silt, all the final phases of irrigation ruins examined in any area were of the same typical small-block construction.

We have seen that there is an evolution evident in the construction techniques of the ancient irrigation works. The excavations carried out by the American Foundation at Hajar bin Ḥumeid and at Hajar Kohlān ('Uma') also showed that small-block construction was the last phase in the evolution of building techniques at these sites. Since this type of construction may be dated in the last centuries before Christ or even later, we may thus say that, with the exception of the Harajeh silt, all the final stages of ancient irrigation ruins discovered in Beihān were constructed within a few centuries either way from the beginning of the Christian era.

The lack of inscriptions on the irrigation works in Beihān is not as serious a handicap as it seems at first sight, since we have archaeological data from an ancient town (the site of Hajar bin Ḥumeid) which was excavated during

its top layers (Christian era and later) down to its foundations, which rested on ancient field silt. With these data at hand we are actually in a much better position to judge the age of the origins of the *Beihān* system than we are with the multitude of inscriptions from the Mārib dam to date that work.

As a rule, inscriptions are usually found on only the latest works; the older works invariably lay buried below. There is also a chance that the blocks bearing inscriptions have been re-used, and in such a case the inscription simply furnishes a date before which the work could not possibly have been built. Such is definitely the case at the Mārib dam, for Fakhry says that many of the inscribed blocks found in the Mārib dam are evidently re-used, and some of them are even installed upside down.²⁰

The datum for the irrigation system studied in detail near Hajar bin Humeid was a low point in the wadi bed in front of the mound, which was arbitrarily set at 0.0 m. Thus the irrigation ruins and the ruined city could be compared with one of the lowest points in the immediate neighborhood. A permanent bench mark was established at the top of Hajar bin Humeid at 22.60 m., and another bench mark was set up in the middle of the irrigation works on a rock outcrop at 11.56 m.

The top stratum of Hajar bin Humeid belonged to a Medieval Arab period which can be dated somewhere between the tenth and the fourteenth or fifteenth centuries A.D. There was no correlation between this period and the ancient irrigation works which had been abandoned some thousand years before. Below this Arab phase there was a stratum characterized by a poor quality of restoration utilizing earlier material and without a trace of inscriptions. There were two or three phases in this stratum which have been dated between the third and the sixth centuries A.D., on the basis of a few typical Byzantine sherds. This stratum was nested among the earlier ruins of the first century B.C.

It has been pointed out that in the case of sluice S13 there are clearly five stages of construction, the last of which consisted of several very poorly constructed unplastered walls utilizing earlier material (Plate 53), added after the Plaster Phase. It seems that this construction can

be correlated confidently with the restoration phase (third to sixth centuries A.D.) at Hajar bin Humeid and therefore it probably dates from the third century A.D. I prefer the earlier dating, since it does not seem that the Hajar bin Humeid irrigation system was used for very long after the last organized reconstruction represented by the Plaster Phase, which, as we will see later, can be dated in the first century A.D. It appears that the Humeid irrigation works were last used early in the course of the third century A.D., and thus we can say that the system was abandoned about A.D. 200, in round numbers.

The lowest point where pottery was found at Hajar bin Humeid was at 7.5 m. and bed silt was found about 6.5 m. The excavators have provisionally dated the foundation of Hajar bin Humeid about 1000 B.C. For the purpose of discussion we will take the round figure of 6.0 m. for the level of the foundations of Hajar bin Humeid. Since the site of Hajar bin Humeid is on the very edge of the Wadi *Beihān*, it is evident that the 6 m. of silt above the wadi, on which the town was originally built, must represent agricultural silt. In other places where there is no evidence of ancient irrigation there are no such silt cliffs.

We may say that about 1000 B.C., when the first houses were constructed at Hajar bin Humeid, the fields in the neighborhood had reached an elevation of 6 m. We have seen that it can be deduced by various means that the fields had reached an elevation of about 14 m. near Hajar bin Humeid when the system was abandoned. We have placed this abandonment about A.D. 200. Thus in 1200 years the fields built up about 8 m., a rate of about one meter every 150 years, or one centimeter every year and a half (Plate 74).

The highest point in the excavations at Hajar bin Humeid was on the wall of a well-built building twelve courses high (three courses of foundations). This building was probably constructed in the first century B.C., and in it were found later remains dating up to medieval times. The construction of most of the late sluices in the Humeid area is of this same type, which has a general range somewhere around the beginning of the Christian era. Primary sluices S1 and S18 (Plates 38, 39) are excellent examples of this type of construction, and the last phases of construction of S13 also show it well.

²⁰ A. Fakhry, *An Archaeological Journey to Yemen*, Part 1 (Cairo, 1952), pp. 68-76.

It has been mentioned above that sluice S1 had two similar capping blocks over a meter long; one of these bore an inscription, which unfortunately has been almost completely worn away by the elements. For over two days A. Jamme worked on what was legible of the inscription and could decipher only the name of the specific irrigation deity, Warâfaw. He has given his opinion that it may belong to the second century B.C. For the purpose of discussion we will take 100 B.C. for the date in round numbers of the construction of this sluice. It can be seen from Plate 38 that when this sluice was constructed the fields were probably at an elevation of about 12 m., for it would have been pointless to build the exit water drop below the field level.

Since the fields had an elevation of about 14 m. when the system was abandoned, 2 m. of field silt were deposited after 100 B.C. If we take the average rate of deposition of 1 m. per 150 years for these 2 m., we arrive at a date of 200 A.D. for the abandonment of the system, a date in perfect harmony with the date reached by correlating the building techniques of Hajar bin Humeid and the irrigation works.

There is no evidence to show whether or not the canal bottoms raised their level at the same rate as the fields; the evidence of the final phases would seem to indicate that they did not. When S1 was originally built the fields were at about 12 m., and when the system was abandoned they were at 14 m. The thresholds of three sluices were at about 17 m., and the tops of these sluices were about 18.5 m. We may estimate that when S1 and S18 were built the canal bottom was at about 15.5 m., or 1.5 m. below the level of the outlets.

We have seen that deposition in the canals was least when the distance between the canal bottom and the sluice outlet was greatest. At this time the silt had to fill the canal up to the level of the sluice outlet before water flowed out. During this time clay and other fine material were apparently deposited. As the canal bottom approached the level of the sluice outlets, the water velocity increased and its carrying power increased, since it flowed out of the sluices as fast as it filled the canal. Once the canal bottom reached the level of the sluice outlet the load carrying power of the water in the canal could

be at a maximum, and much of the sediment would be washed out of the sluice openings.

It has been shown that the 600 m. of canal between S1 and S18 was apparently more or less level. Over this distance the canal was about 10 m. wide and there were 4 or 5 1-m.-wide sluice openings to let the water out. Thus while sediment could accumulate in the main body of the canal, even if the canal bottom were above the bottom of the sluice opening, the fast moving water around the area of the sluice opening would keep that area at the elevation of the sluice opening—if the sluice opening were not raised. But it seems that the sluice openings were raised continually, apparently to keep as much of the sand in the canal as possible. This is shown in Plate 54 where slabs were put in front of the sluice opening.

Actually, canal deposition is so erratic that with the evidence on hand it is impossible to say what the rate of its deposition was. From the time when the final phases of the Hajar bin Humeid sluices were constructed the field levels rose from about 12 to 14 m. We have estimated that when these sluices were constructed the canal bottom was at perhaps 15.5 m., or slightly higher, but that at any rate it could not have been any higher than 16 m. These sluices had openings with thresholds at a level of 17 m.; their tops were at about 18.5 m. Thus if the canals silted up at the same rate as the fields, the final level of the canal bottoms would have been at least 17.5 m. and perhaps even 18 m. Since the tops of the sluices were at only 18.5 m., a canal bottom at 18 m. is quite out of the question, and one at 17.5 m. is high (Plate 73). From the slabs in front of the various sluices it seems that the final canal bottom must have been closer to 17 than to 17.5 m. Thus, in the final phases at least, the canal apparently did not silt up quite as fast as the fields.

From these deductions as to the silting rate in the final phases of the Hajar bin Humeid canal system we arrive at a point of considerable historical import. Since the tops of the sluices were about 18.5 m., and since it seems that the canal bottom must have built up to over 17 m., there was only slightly more than 1 m. left for the depth of water in the canal. In other words, the time had come when the water of the canal should have been heightened. But it was not. The cost of this would certainly not have been

any more than the great reconstruction that took place in the early part of the first century A.C., and in fact it should have been much less. Half a meter of blocks added to each sluice would have sufficed, and of course a half meter of earth would also have to have been added to the walls of the whole canal. Certainly the work involved in heightening the canal must have far outweighed that of building up the sluices. However, in the early third century A.D. the effort to carry out this normal maintenance never materialized.

Thus the evidence from the final phase of irrigation near Hajar bin Humeid shows that the canal probably silted up at a rate slightly slower than the fields (1.5 vs. 2 m.). We can reasonably assume that on the average both rates were about the same, since undoubtedly in earlier times the rate of silting in the canals relative to the fields must have been generally greater.

Previously we have classified the Hajar bin Humeid irrigation ruins into Late, Middle, and Early Phases. It was shown that there were undoubtedly "Earlier Phases." We have seen that the Late Phases near Hajar bin Humeid are characterized by works constructed about 100 B.C. and used until about 200 A.D. with a minimum of maintenance. The works were apparently plastered in the first century A.D.

The Middle Phases were typified by embankments E1, E3A, and E3B, and by sluices S10A and S10B. Sluice S10A had a top of about 15 m., some 3.5 m. below the tops of the Late Phases. At the average rate of the field deposition of 1 m. per 150 years, this would indicate that the Middle Phases were constructed about 500 years earlier than the Late Phases, or c. 600 B.C.

Two Himyaritic inscriptions were found on an irrigation installation in the Khudreh area near Wadi Hamad (Plates 75, 76). Its elevation seemed to be about in the Middle Phases. However, the construction seemed to be more closely related to the Early Phases than the Late Phases, being of massive blocks of red quartzite. A. Jamme holds that the inscriptions on this structure date from not earlier than the fourth century B.C. (see Appendix III for Jamme's study of these inscriptions).²⁷

²⁷ Unfortunately, weathering has destroyed the most critical parts of the large inscription at the center of the three lines. Thus the proper restoration of the text can only be an educated guess, and two scholars might well

The Early Phases of the Hajar bin Humeid canal are represented by some ruins with tops at 12 m., or about a thousand years earlier than the Late Phases, which takes us back to around the era of the founding of the city at Hajar bin Humeid.

We have seen that the bed silt on which the foundations of Hajar bin Humeid are built can be dated about 1000 B.C. I purposely selected the datum near Hajar bin Humeid as an average level in the wadi bed so that the surrounding depositions due to ancient irrigation could be appraised. I examined many miles of wadi beds in Beihān where there had not been any ancient irrigation. In no case was the wadi entrenched more than about a meter, usually where the meandering bed had cut into the base of a gently sloping alluvial fan. In Hadhramaut there are dozens of feet of silt that were the result of geological action. In Beihān there is no silt formed by natural geological processes.

Thus the 6 m. of silt above the wadi bed on which the ancient town at Hajar bin Humeid was built can only represent a silt accumulation caused by irrigation. If (to be on the safe side) we assume that the natural elevation was 2 m. when irrigation was started, we have 1 m. of agricultural silt accumulating before the town was started. At the rate of deposition of silt that took place after the town was started, this 4 m. would represent about 600 years. Thus we can say that the origins of irrigation in Beihān go back at least to the middle of the second millennium B.C., and very probably earlier.

A tomb was excavated on the silt plateau east of the Hajar bin Humeid canal (Plate 37). A single small inscription and two inscribed sherds were found in the tomb. Unfortunately the ma-

come up with two entirely different restorations. In the second line the most important part of the whole inscription is lacking, what was built or whether it was built, rebuilt, bricked up, plastered over, or what. These inscribed blocks were associated with the only dam discovered in Beihān, and the large block was apparently in the sluice of this dam. Jamme believes that the best restoration is "built the well." I prefer "rebuilt the dam," or words of a similar sense which will fit into the allotted space. Rebuilding the dam and "hiding it from danger" would mean facing the upstream side of the dam with stones such as was done to the Mārib dam a number of times. Such a stone facing was found near the sluice. The sluice was probably also raised at the same time. If Jamme's "built the well" is correct, then we can only assume that the block was re-used. The field evidence did not seem to indicate this.

terial is too poor to date precisely. (For a description of this tomb see section I.) The tomb was so constructed that it appeared to have been built on ground that had an original elevation of 19.5 m. or more. This was also estimated as the final elevation of this silt plateau when the canal system was abandoned. If the tomb was constructed before the first century B.C., it seems that it must have been built on a mound of silt piled up for the purpose. There seems to be evidence that houses in the irrigation areas were placed on mounds of silt to keep them above the maximum water level, so there is no reason why a tomb could not also be placed on a mound to keep it out of the irrigation water.

W. F. Albright has shown that the state of Qatabān saw its greatest days from the sixth century B.C. to the early first century A.D.²³ Excavations carried out by the American Foundation proved that the ancient Qatabanian capital of Timna' (modern Hajar Kohlān)—at least its Southwest Gate area—was destroyed by fire about the beginning of the Christian era. After the end of the Qatabanian era in the early first century A.D., inscriptions become very scanty in Beīhān. Those that are found belong to the period of Hadhrami hegemony, and even these disappear completely after the second century A.D.

The Qatabanian kingdom was thus subdued in the early first century A.D. by the kings of Hadhramaut, who ruled Beīhān for more than a hundred years. The Hadhramis certainly attempted to keep up some of the irrigation works, for there is an inscription (Glaser 1619) from Beīhān dated in the early second century A.D., mentioning the irrigation works undertaken by a Hadhrami king in the district of Wa'lān. But in general the irrigation works apparently were allowed gradually to decay. When major rebuilding was necessary, because of the natural silting process that was characteristic of both fields and canals, a sustained effort was no longer possible and the systems were one by one abandoned when they had been used as long as possible.

Organized irrigation, carried out on the scale of Qatabanian greatness in pre-Christian centuries, apparently died out about a century after the last inscriptions, which are dated in the early

second century A.D. This is in vivid contrast to Mārib, where Himyaritic inscriptions relate that the great works were repaired as late as the sixth century A.D. Irrigation on the scale of the great Qatabanian times ceased in Beīhān, not because the systems became silted up to a point where they were unusable, but because there was no longer an organized effort to carry out the normal maintenance and rebuilding that was necessary.

It is interesting to note that, as the whole system of fields and canals silted up, the height between the top of the canal and the fields actually decreased. However, the bottom of the canal apparently did remain about the same distance above the fields (Plate 74). Thus around 100 B.C. the top of the canal was about 6.5 m. above the fields, while about A.D. 200 it was only 4.5 m. above. During this same period the height of the canal bottom above the fields decreased from 3.5 to 3 m. It would seem that 3 m. was certainly not excessive, and thus it seems that one thousand years before there must have existed about the same differences in elevations, as shown in the sketches of the canals in Plate 74.

The whole point is that, while the fields did build up in places to astonishing heights above the original ground level (at Hajar bin Ḫumeid some 12 or 13 m.), the relative heights of the canals above the fields did not change appreciably. Furthermore, the canals were frequently in the center of the irrigated areas, surrounded by fields on both sides, so that washouts did relatively little damage. There seems to be evidence that these ancient canals were provided with wide overflows set below the top of the canal walls, so that any great *seil* flowed out of the canal without washing out large sections of the works.

MODERN IRRIGATION IN BEĪHĀN

Modern *seil* irrigation in Beīhān is in general conducted in a very different way from what it was in ancient times.²⁴ Today the Beduins

²³ W. F. Albright, "The Chronology of Ancient South Arabia in the Light of the First Campaign of Excavation in Qatabān," *Bulletin of the American Schools of Oriental Research*, no. 112 (1953), pp. 9-11.

²⁴ For a short account of modern irrigation practice in Yemen, see Future Rain, "Note sur l'irrigation dans la partie sud de l'Arabie et le désert du Yémen," *Archives M. P. S. S. A. S. S. R.* (1953), pp. 21-22. I am indebted to A. J. G. E. Smith for reference to my attention.

usually attempt to get water out of the main wadies by either one of two methods. In the upper part of the valley where the gradients tend to be greater, they run earth and stone embankments out into the wadies to deflect part of the *seil* into a canal leading to the fields. In the lower part of the valley, they build earth dams completely across the main wadi bed to raise the water level up to a point where it will flow into fields on each side (Plate 77). Both these systems were used in ancient times in other places in southern Arabia, as we shall see later. The Mārib dam is comparable to the earth dams stretching completely across the Wadi Beihān, while at Hureidha some 2000 acres were irrigated in ancient times by deflecting part of the main wadi into a canal by means of a revetment projecting into the wadi bed.

As one goes down the Wadi Beihān the technique of building earth dams completely across the wadi becomes the rule (Plates 78, 79). This technique starts at Nuqūb, where there are usually over half a dozen of these dams (Plate 79). Above Nuqūb there is very little modern irrigation until Beihān el-Qayāb is reached. All the irrigation between Nuqūb and Beihān el-Qayāb is conducted by means of earth and stone revetments built out into the wadi to divert part of any *seil* reaching that point. Illustrations of this type of irrigation are shown by the small area of Dirneh irrigated by part of Wadi Farā' (Plate 36) and by irrigation around the village of Hamād where several small wadies are partially tapped (Plate 80). The Qatabanians completely used up many of the large tributary wadies so that nothing was left to flow into the Wadi Beihān. Today only a few of the very smallest wadies are used completely. The Qatabanians never bothered with most of the very small wadies, unless they happened to flow into one of their irrigated areas.

The main difficulty with modern techniques is that the field levels are continually building up above the wadi from silt deposits. I saw almost 2 m. of water behind a dam near Nuqūb that was not yet high enough to flood the fields (Plate 79). Since there is a succession of these dams in this area, there is no solution to the problem except to build the dam a little higher every year and wait for enough water to flood the fields. Actually each has to wait his turn,

for with the first large rain all the dams wash out progressively.

The same problem is found in fields irrigated by revetments. However, in this case silting of the fields can be fought by moving the revetment inlet upstream. The only apparent limitation is the encroachment on the rights of a neighboring clan of farmers farther upstream. In general the Qatabanians never had this problem since in most cases they brought the water directly from the tributaries down into the field areas. In instances such as these the fields simply backed up on the water sources, and deposition of silt and sand naturally raised the level of both canals and fields. Only the stonework of the sluices and the earth walls of the canals had to be heightened to keep pace with silt deposition.

Modern irrigation is not laid out so that a *seil* is broken up and uniformly dispersed. Today the Beihānis attempt to harness the main Wadi Beihān at progressive stages down the valley. A large *seil* usually breaks out of the upstream canals, while the first sizable *seil* sweeps all the earth dams out into the desert. Thus only a fraction of the available water is utilized. The Qatabanians developed the knack of breaking down any *seil* into hundreds of small streams where its strength was lost. They started by separating all the large tributaries. Then they provided systems for dividing each tributary and dispersing it uniformly over their fields. While abnormally heavy rains must certainly have washed away parts of the ancient systems, the 15 to 20 m. of silt that were deposited on the Qatabanian fields attest to the general success of their methods. This technique is a lost art to the Beihānis of our day.

The poor efficiency of *seil* utilization in Beihān today appears from the fact that when it really rains the resulting *seil* rages down the main wadi and out through a channel in the Ramlet Sabattein for a distance of 65 km. past the mountains. Traveling around Beihān today one is left with the impression that there was much more land under cultivation in ancient times than there is today. However, this does not appear to be strictly true. Where there were about 10,000 acres under irrigation at one time or another in ancient Qatabān (see Table I), today there is, surprisingly enough, about the same acreage under some sort of cultivation.

TABLE I

COMPARATIVE MATERIAL

Ancient silt	Average dimensions, miles	Acres
Wadi Khirt	1.5 x 0.6	550
	1 x 0.5	300
Harajeh	1.4 x 0.8	700
Hadaqeh	3 x 0.4	750
Jidsar	1.5 x 0.5	500
	(Possibly 2 times this)	
Sa'id	1.7 x 1	1100
Khalbas	2 x 0.25	300
Khudreh		
In front of Khalbas	2 x 0.3	400
By Jebel Khudreh	2.5 x 0.7	1160
S. ed-Dahwal	3 x 0.4	750
Mablaqah	3 x 0.6	1200
Warikeh	1.6 x 0.5	500
Hajar bin Humeid (Including Fara')	2 x 0.8	1000
Nuqqub	?	400 +
Suqqut el-Milh	?	
		9350 +

The largest single area of modern cultivation (modern cultivation is shown by the solid areas in Plate 35) is in the north in the Wadi Beihān "delta." This area amounts to some 6500 acres (about 4500 acres on the east and 2000 acres on the west). The area north of Aseilān is maintained by the Bal Ḥārith tribe and is a poorly cultivated area consisting of scattered 'elb trees and many sandy fields. Only when all the dams to the south have been broken do the Bal Ḥārith receive any *seil*. It should be noted that the majority of the land under cultivation in the north in Bal Ḥārith territory was not under cultivation in Qatabanian times, since there was little water left over from the upper valley projects. Within the area that was under cultivation in ancient times, the ancients had about three times as much land under cultivation as do the modern Beihanis. In all fairness it should be pointed out that the present Beihanis are under a considerable handicap, since the eroded Qatabanian fields cover much of the valley, and huge masses of sand blown in from the north cover much of the rest of the valley (and much of the ancient fields, too). However, one fact is certain: the ancients irrigated their 10,000 acres very much more efficiently than do their modern descendants. With planned reclamation none of the ancient areas could be rebuilt.

Mārib

The fact that there was a dam at Mārib, the ancient Sabaean capital, has never been forgotten, since it is mentioned in the Qurān. In fact the Mārib dam is the most famous and well-known construction in pre-Islamic history. The Arab knows of the Mārib dam just as he knows of the Queen of Sheba. Up to 1951 only three Europeans—Arnaud, Halevy, and Glaser—had visited Mārib and the site of the dam. In 1951 the American Foundation for the Study of Man visited the area of the dam and later conducted archaeological work at several sites at Mārib, but there was no study of the irrigation works. (The writer did not visit Mārib.) Glaser published three excellent sketches of the main irrigation works at Mārib, besides collecting many inscriptions from them.²³ The closest Philby got to Mārib was a volcanic peak about five miles to the north, from where he could see only a few buildings of the city through field glasses, but nothing of the dam or other irrigation works.²⁴ Bruce Condé spent several hours at the dam in 1953 and was able to make certain new observations which he will publish in the near future.

The town of Marib is at some distance from the rather steep escarpment of the Balak hills that separate the desert from the mountains of Yemen. The Wadi Dhāna has cut a deep gorge through these hills and comes out of the rocky plateau back of Mārib through a narrow canyon. Mārib is on the north bank of this wadi, which flows to the east. There is a smaller wadi, the Wadi es-Sarila, which carries the drainage from the northern Balak hills, and joins Wadi Dhāna below Mārib (Plate 81).

Glaser relates that the famous Mārib dam consisted simply of an earthen mound about 750 paces long, i.e., about 550 m. (figured on the basis of 0.75 m. per pace or 2.16 ft. per pace), stretching across in front of the gap the Wadi Dhāna makes in the Balak hills. Glaser also stated that the dam rose from 6 to 7 m. above

²³ Cf. A. Glaser's *Excavations at Mārib, 1951* (Leiden, 1953), pp. 6-69.

²⁴ Cf. J. B. Philby, *A Year in the Desert* (London, 1923), p. 22.

the level of the wadi. In cross section the dam was shaped like an isosceles triangle with sides sloping at 15°. The upstream face of the dam was covered with small sharp unhewn stones which were held together so strongly by mortar that it was impossible to detach them. Since there was an accumulation of many feet of mud, it was difficult to detect the actual base of the dam.

Two great systems of sluices conducted the *seil* from each extremity of the dam (Plate 82). This was a clever device to eliminate breaching (and hence weakening) of the central portions of the dam with stonework to let water out. Glaser relates that the dam ran approximately north-northwest. At its southern end is the sluice system known as Marbaṭ ed-Dimm (Plates 83-86). Marbaṭ ed-Dimm means "the place where the cat was tied" and has reference to the legend that the collapse of the dam was caused by a rat. This sluice system ingeniously utilized two gigantic blocks of rock that had separated from the main rock of the wadi walls. There is an overflow wall 3.5 m. high bridging the gap between the main rock and a large split-off block (part of which has been artificially cut out). On the northern rock there is a massive wall about 60 m. long and 4.5 m. wide, with a level top about 3.5 m. above the lower overflow wall (Plate 81). This system of sluices split the *seil* entering it into two streams. Four inscriptions were found by Glaser on these works (Glaser 513, 514, 523, and 525).

The northern system of sluices contains one great wall over 140 m. long, about 9 m. thick, and from 5 to 9 m. high (Plates 87, 88). The part of the wall (about 52 m. long) abutting the Balak rocks is 3 m. lower than the rest of the walls (and the dam) and apparently acted as an overflow for excessively high water. This northern sluice system conducted water from the northern end of the dam through a single 1000-m. canal to a rectangular structure which, according to Glaser, divided the water entering into eight different streams. Bruce Condé has informed me that this canal was about 12 m. wide, but that the canal walls widened to form a basin about 23 m. wide and some 65 m. long (essentially the length of the northern wall), which apparently acted as a settling basin for the heavier material carried by the *seil* (Plate 82). Presumably the silt was periodically cleaned

from this basin. The 1000-m. canal had earth walls which were covered with a cemented stone lining on the inside (water side) just as the main dam was. Bruce Condé also tells me that the main distribution works at the end of the canal had four sluice openings on each of three sides to give a total of 12 rather than 8. Other canals led the water from the main rectangular distributing center to smaller ones from which the water was conducted to the fields. Glaser recorded 22 inscriptions from the walls of the northern sluices or nearby, the most important of which are Glaser 541, 551, 554, and 618.

The southern sluice system is so close to the course of the natural wadi bed that almost all evidence of the dam has been washed away. However, there does remain, at the very southern end of the dam, the upstream facing of one of its stages. This is clearly seen in one of the photographs (Plate 83) as the rock rubble at the very base of the highest tower. When Glaser noted that the dam was 6 to 7.5 m. high and did not seem to be much higher than the overflow of the southern sluice system, he was basing this statement on the remains of this dam facing at the base of the high tower, for the overflow is at approximately the same level as the top of this remaining facing.

If the southern sluice overflow were at the same level as the top of the dam, this would mean that none of the *seil* would flow through the sluice. This does not seem probable. Glaser suggested underground tunnels which also are improbable. Therefore it would seem that the dam facing which is preserved belongs to one of the earlier phases of the Mârib dam. Two facts support this hypothesis. First is the elevation of the sluice outlet, which implies a dam top considerably higher. The second is the fact that the top of the sluice rises about 5 m. above the overflow, while the high tower which acted as the south abutment for the dam rises about 7 m. above the overflow. These figures are estimates made from the photographs of the southern sluice system, using the known height of the men as a scale (Plates 85, 86). Glaser's figures are several meters lower.

Examination of the photographs shows that the last 6 or 7 courses of the abutment are of rougher masonry than the lower courses and thus represent a later addition. It may be assumed that at the final stage the top of the dam was

approximately at the same elevation as the top of the abutment. The reason that the only stone dam facing which is preserved happens to be at the level of the sluice overflow is because it rests at the base of the south abutment on the same rock on which the abutment is built. All higher remains have vanished. If the *seil* approached the top of the abutment, it is evident that the sluice pier south of the abutment would be submerged for a time as water flowed on both sides of this pier. But this water would all flow out through the outlet canal.

An interesting fact is evident from the photographs (Plates 85, 86). A deep opening 5 m. wide has been artificially cut out of bed rock between the abutment and the southern sluice pier. Thus it seems that in earlier times, when the dam was low, there was no southern sluice system, and the dam simply abutted against the rocks at the south end. There may have been a slight crevice here at the start, but the thickness of the hewn areas would seem to indicate that its original width was not great. This is supported by inscriptions (Glaser 513, 514) on the southern sluices which state that the local ruler had an outlet cut in the dam here. It would seem that this refers to the passage cut for the first southern sluice. These particular inscriptions can be dated with a fair degree of accuracy, as we shall see later, to about 500 b. c. Other additions were made later. Thus it can be assumed that when the system was started, only the northern plain was irrigated. The fact that Mârib is located on the northern plain strengthens this supposition.

It should be evident that the "dam" at Mârib was nothing more than an earth mound built across the mouth of the Wadi Dhâna and it is also certain that there were no sluices in the center of the dam. The *seil* collecting behind the dam was forced to pass through sluices at either extremity of the dam. It seems clear why the sluices were situated at either end of the dam, and not in the middle. Originally the Wadi Dhâna must have been limited to some sort of a bed, naturally dividing the land to be irrigated into two parts. Thus to get water into these two areas the *seil* had to be led along high ground and then down on the land. A sluice in the center of the wadi would have been of no use. The most logical plan of irrigation at Mârib was exactly what they developed, a dam in the

center of the wadi to raise the water above both lateral field levels, and sluice works at each extremity to divert the *seil* into the land divided by the original wadi.

Imagine, now, the situation when the irrigation works at Mârib were first conceived and installed. A low earth dam was thrown across the wadi to lift the *seil* to the height of the northern field areas. Assume that the difference in height was only 3 m. and that a dam 4 m. high was used. Now, if the level of the stone outlets at the northern extremity is 3 m. above the center of the wadi bed, there is obviously a 3-m.-deep basin right back of the dam which must fill with water before any water will flow out of the sluice outlets. As the first water of the *seil* rushes into the basin behind the dam, laden with silt and sand, its velocity is obviously reduced to almost nothing, and the coarser silt and sand rapidly precipitate. Even after the *seil* starts to flow out of the sluice outlets, this deposition will continue rapidly as the velocity of the *seil* increases and starts to wash gravel into the natural settling basin. It should be quite obvious that it will not take many *seils* to fill the basin with silt, sand, and gravel sediments (Plate 82).

This description graphically shows why the Mârib dam could not possibly have been used for water storage. What most people who propose such a theory forget is the fact that in a desert climate there is no foliage to keep loose material from being scoured from the rocky slopes and that the amount of material washed away in desert cloudbursts is at times almost unbelievable.

Once the basin has filled up, the dam becomes inherently more stable. The silt and clay which are deposited tend to "waterproof" the basin sediments so that the *seil* does not seep through the downstream face and undermine the dam. Thus for the initial case above, the height of water that the dam had to hold back was rapidly reduced from over 3 m. to about a half meter. In the case of the final stages we have the top of the dam about 11 m. above the wadi bed, with the southern sluice outlet at about 7 m. But, in all probability the basin behind the dam was silted up to about 7 m. Normally the dam probably retained a maximum of 3 or 4 m. of water in the final stages.

A dam of 6 or 7 m. above the wadi would be nothing unusual. Dams of this height and size

to 300 m. in length are constructed by the dozens every year in neighboring Beihān (Plates 77, 78). A dam of 14 m. is quite another story. But in all probability, even when the dam top was 14 m. above the wadi bottom, the height of the dam above the sediment behind the dam was only about 7 m. (Plate 89).

If the earth dam were periodically breached by exceptionally large *scils*, the water would be lost and would flow down the old wadi bed between the two irrigated areas. It is obvious that any break would not only wash out the dam wall, but would do much more serious damage by eroding part of the basin floor behind the dam. This would mean that if the basin floor were eroded to the original wadi level, a hole 14 m. deep in the dam would have to be repaired, and the repaired section would have to hold 10 to 12 m. of water, unless the eroded basin floor were filled in.

Since these earth dams are built with sides at about 45° , the amount of earth and therefore the labor required to build such a structure varies as the square of the height. Thus a dam 7 m. high has a cross section area of about 50 square meters, while a dam 14 m. high has a cross section of about 200 square meters (Plate 89). With abundant labor, an increase of four times in the labor of maintenance would not seem to be a serious handicap. More serious than the labor required might be the fact that once the dam was seriously breached, the repaired section might be a perpetually weak spot.

The remains of the level silt plateau which rose behind the earth dam at Mārib can be seen in the photographs of the northern sluice works as gray layers of sandy silt to the right (Plates 87, 88). It is interesting to note that these deposits are obviously stratified, indicating an origin similar to that supposed above. It is also interesting to note that the photographs seem to indicate that the area behind the dam was silted up to the level of the emergency overflow.

The relative elevation of the southern and the northern sluice works is not known. However, we are in a position to deduce this from the facts at hand. The stone-covered dam is just about the same height as the tops of the northern sluices. If the top of the dam at the southern end was 14 m. above the wadi bed as I have suggested (Plate 89), then the top of the northern sluices must have been at the same elevation as that of

the highest point of the southern sluices, the southern abutment. Glaser says that the overflow of the northern sluices was about 5 m. high where it met the higher part of the sluice system. The photographs (Plates 87, 88) show that the top of the northern sluices is about 3 m. above the overflow. Thus it would appear that the overflow of the northern sluices was about 3 m. below the top of the southern abutment. The high tower on the northern sluices is a modern Arab fort. The outlet of the southern sluices appears to be about 7 m. below the top of the dam. Thus it must be assumed that a channel to the northern outlets was kept clean behind the dam.

Another fact becomes evident from these considerations. The northern sluices are built on the bedrock of the Balak hills, as is shown very clearly by the photographs (Plates 87, 88). Since the top of the northern sluices and the dam where it joins the works are only about 8 m. above bedrock, it is evident that these constructions must be relatively late in the history of the dam as a whole. Indeed this seems to be shown by inscriptions on these works, as we shall see later. The point is that when the dam was only 7 m. high at the southern end, only a few feet of water could have reached the existing northern works. Thus it seems evident that the first northern sluices must have been constructed at a lower elevation and are now buried under the silt.

It is probable that the first works consisted of a dam across the main wadi which forced all the flood water into a single canal. Later when the deposition of silt over the whole system raised the general elevation, an outlet was cut through the rocks at the southern end. Then at some later period the new northern sluices were built. This is probably the reason for the curve in the northern end of the dam (Plate 82). The location of the original northern sluices is probably somewhere to the east of the existing northern sluices. Because the inscriptions found on the two existing sluice systems indicate a later date for the northern sluices, most people from Glaser down have stated that the southern sluices represent the original construction of the dam. It is true that the surviving works of the northern sluices are later than the existing southern works. However, the original northern works are apparently buried under tons of silt.

As long as the dam was kept in good repair the

whole system built up gradually just as at Beihān. Now that the Wadi Dhāna has completely washed away the accumulated sediments from the southern part of the basin behind the dam, it looks as though the dam would have to resist 10 to 12 m. of water. But when the system was kept in repair the silting of the fields did not necessarily lead to a point where the works would have to be abandoned. From the fragmentary evidence at hand, it appears that the area behind the dam may have silted up at a greater rate than the fields. It thus seems that the silt behind the dam may have been periodically cleaned out. In the final stages of use it appears that the dam top was about 14 m. above the wadi bed. While it was not impossible to repair breaks in the dam, a point had thus been reached where it was very difficult and required a concentrated effort.

That tremendous effort was required for major overhauls is indicated by two important inscriptions which refer to massive reconstructions. During the great reconstruction carried out in A.D. 450 Sharāḥbil Ya'fur requisitioned some 20,000 laborers from Ḥimyar and Hadhramaut (Glaser 554). The size of the labor force required in A.D. 542 for the work carried out under the Abyssinian viceroy Abraha is indicated by the provisions he requisitioned for the workers: over 200,000 sheep and goats, some 50,000 sacks of flour, 26,000 packages of dates, and 3000 camels and oxen (Glaser 618).

The breaking of the Mārib dam is given by Arab historians as the cause of the downfall of all the South Arabian kingdoms (a statement which is certainly not substantiated by the facts). For many centuries Arab writers have been giving causes for the collapse of the dam—mostly acts of God. Yet from the study of the dam presented above, it is difficult to see how natural causes could have damaged the dam to such an extent that it was impossible to repair. That this was not the case is also implied by the remarkable state of preservation of the sluices which stand today at the northern and the southern ends of what is left of the dam. So perfectly are these massive works preserved that it is hard to believe that the system fell into disuse almost 1500 years ago. The logical explanation for the final collapse of the Mārib dam seems to be that disrupted social conditions, perhaps a state of anarchy, prevented the repair of a normal wash-

out of the earth dam and the repair was delayed until it was too late, after which time the whole system gradually fell into complete decay.

It is interesting to note that today the task of rebuilding the Mārib dam would be easier, now that all of the sediments which had accumulated behind the dam have been swept away. The southern sluice overflow could be easily dug out to its lowest level, and a low earth dam could be constructed to force the *seil* southeastward again as in ancient times. The photographs seem to indicate that at the southern end there is still plenty of gradient leaving the sluice.

A second dam known as Mebnā el-Hashraj was constructed to regulate the water of Wadi es-Sarila, which carried the northern drainage (Plate 81). This work consisted of three massive walls each 150 to 180 m. long with numerous sluices between them. Glaser found ten inscriptions on these walls.

While I have not visited Mārib, I was extremely fortunate in flying over the ancient district after leaving Beihān, and it is safe to say that more can probably be recognized and inferred from the air in a few minutes than from the ground in days. Mārib can be seen some distance from the rather steep escarpment of the Balak hills, and the narrow canyon gorge of Wadi Dhāna can be clearly seen. Around the escarpment mouth of the wadi there is a huge "delta" of silt plainly visible on the desert. Still more remarkable than the extent of this silt delta is the fact that the whole surface is covered with the "rectangular erosion" so commonly seen in Beihān. The area was uniformly divided into small rectangular plots, which were apparently parallel to each other. From the air I could see nothing to indicate a dam near the mouth of the wadi, but the very long canal walls of the 1000-m. canal were plainly visible.

Philby quotes the Arabic work of the Egyptian explorer Nazīh Muaiyid el-Adhmi, who visited Mārib and gave a detailed account of the irrigation works there.²² He reported 22 diverging masonry walls radiating fan-wise below the dam. Where these fit in with the known works is not apparent. No fan-shaped rays were visible from the air. Ahmed Fakhry visited Mārib in 1943 and has since published some photographs of the

northern and southern sluice works,³³ but the maps he publishes are taken from Glaser.

Glaser thought that the water accumulated by the Mārib dam was sufficient to irrigate amply all the land on the borders of the desert as far as Hadhramaut, as well as the plain of Mārib, and to transform this whole area into a vast garden. Certainly Glaser could not have been correct in this statement, for the evidence clearly seems to indicate that only the Mārib delta, or the so-called "plain," was irrigated by the irrigation works at Mārib. This consists essentially of areas on both sides of the Wadi Dhāna, which are known in the Qurān as the "two gardens, one on the left side and the other on the right." Using Glaser's sketch map of the Mārib area, I have estimated that each of these gardens contained about 2000 acres (Plate 81). These are the areas shown within the dotted lines on each side of the Wadi Dhāna. The accuracy of this estimate is based on the scale which I have added to Glaser's map on the basis of information supplied by Frank Albright that the distance from the town of Mārib to the dam by automobile was about three miles and that the road was rather straight. To be on the conservative side, the scale on the map is based on a straight-line distance between Mārib and the dam of two and one-half miles. Of course the accuracy of our estimate of the size of the two gardens is also dependent on the accuracy of Glaser's sketch map.

The inscriptions Glaser found on the Mārib irrigation works provide ample evidence for dating certain of the works, although some of the inscribed blocks were obviously re-used. The inscriptions on the rock beneath the southern sluice structure appear to be the oldest, dating from the MKRB period (c. 750 to 450 b. c.). MKRB Sumuhū'alay Yanaf, son of Dhimri'alay, made an outlet in the dam (Glaser 513, 514), while MKRB Yithī'amara Bayyin, son of Sumuhū'alay Yanaf, built a watercourse (Glaser 523, 525).³⁴

If the outlet cut through the southern abutting rocks dates only from about 500 b. c. as I have suggested, then I should have no hesitation

³³ A. Fakhry, *op. cit.*, Part III, Pls. XXII-XXVII. In the captions to Pls. XXII-XXVI, Fakhry has inadvertently transposed the words "northern" and "southern" throughout.

³⁴ According to W. F. Albright's unpublished study, these princes reigned in the late sixth century b. c.

in dating the origins of the dam to the beginning of the MKRB period, i. e., c. 750 b. c., and it is reasonable to suppose that it may even antedate this. As pointed out above, the dam must have originally irrigated only the northern plain, and thus the first northern sluices are probably buried under the silt somewhere.

The northern sluices did not attain their final form until the time of King Shammar Yuḥar'ish (whom we can date about A. D. 325). Near the northern sluices are the two stelae bearing the inscriptions which refer to the now-famous later repairs of breaches in the main dam. In A. D. 449 King Sharahbil Ya'fur completely renovated the works, but in the following year, A. D. 450, a breach had to be repaired again by the same king (Glaser 554). The last inscription referring to a breach that had to be repaired belongs to the Abyssinian viceroy Abraha (Glaser 618). This may be placed about 542 A. D. This inscription indicates only that the last recorded repair was made at this time, but it shows that the dam was finally destroyed some time after A. D. 542. The dam was probably intact until the end of Abraha's rule in A. D. 570, but it seems that it was destroyed shortly after, possibly c. A. D. 575.

Since the destruction of the Mārib dam is mentioned in the Qurān, it has occurred to me that the date of its destruction might be deduced from that source. In an effort to explore this field, I have consulted Dr. Nabih Amin Faris, who has kindly written me as follows:

I agree that the dam must have been destroyed after A. D. 542. I am not sure, however, that it was still in use after the Abyssinian period (570 A. D.). The best lead is in the Qurān, Surah XXXIV: 14, 15—"A sign there was to SABA, in their dwelling places:— two gardens, the one on the right hand and the other on the left:— ' Eat ye of your Lord's supplies, and give thanks to Him: Goodly is the country, and gracious is the Lord! ' But they turned aside: so we sent upon them the flood of Iram; and we changed their gardens into two gardens of bitter fruit and tamarisk and some few jujube trees.' This Sūrah is usually accepted as Meccan, with the exception of the sixth verse which is Medinese; so it must have been "revealed" before A. D. 622. Al-Ālusi, in his commentary *Rūh al-Ma'āni* which was completed in A. H. 1267 and published without a date in Cairo, states in volume 22, page 95, that the Sūrah is Medinese, revealed after A. H. 9, that is a year or so before the death of Mo-

hammed. This tradition is cited on the authority of al-Wāqidi, who is usually reliable.

Whatever the case may be, the catastrophe must have fallen before the death of Mohammed and must have been still fresh in the minds of the people.

Thus in round numbers it seems that the Mârib dam was destroyed and never repaired c. A.D. 575. It would seem that this estimate is within a generation or so of the correct date.

El-Jauf

Forty miles west of the great desert necropoliſes of Ruwaiq and 'Alâm 'Abyadh, in the Jauf region, Philby discovered the ruins of three Minaean cities known in antiquity as *YLT*, *HRB*, and *KTL*, at Khirbet Sa'ud, Asâhil, and Duraib respectively (Plate 34).³⁵ Philby says that all around Asâhil there was a vast tract of sand and river-silt, suggestive of ancient agriculture on a grand scale. Philby further relates that scattered mounds of masonry in the area are doubtless the remnants of peasant dwellings. However, it seems possible that these ruins may well be those of ancient irrigation works and that this area was under Minaean cultivation.

Wadi Markhah

The first big inhabited valley east of Beihân is Wadi Markhah (Plate 34). Philby visited Markhah and reports an ancient irrigation system similar to that found at Mârib.³⁶ Basic conditions are similar to those at Mârib, for the wadi debouches from the rocky hills between two peaks which constrict it to a width of several hundred meters at that point. Below this point Philby found a number of walls radiating "fan-wise across the delta." The walls varied considerably in length (up to about 4 miles) and were in pairs. The areas between the pairs also varied considerably. Philby concluded that "the walls served merely to divide up the cultivable area into convenient strips, into each of which the water must have been admitted in turn

through sluices in the dam,"³⁷ which he postulates existed at the narrows. It would seem more probable that the pairs of walls were actually canals by means of which the water was conducted to and dispersed over the field areas.

In the foothills of Hâid Dhîyâin (below the foothills of which lie Markhah to the north and Nişâb to the east) Hamilton reports an extremely interesting system of hill aqueducts.³⁸ They consisted of V-shaped channels cut into the hillsides. Rain collecting in these channels flowed into aqueducts, then into the fertile land in the direction of Nişâb. The channels were plaster-lined.

Stark reports another strange system of hill aqueducts in Hadhramaut.³⁹ She relates that the Bedouin claimed that in the high ravines of Wadi 'Amd they occasionally find wooden troughs clinging to the cliff faces high above human reach. Presumably these are similar to the wooden troughs that may be still seen in use today in certain parts of Switzerland for conducting water from the high ravines into neighboring fields that would ordinarily be too high to irrigate.

In Wadi Markhah lies the big walled site of an-Nâb. According to Hamilton this site is the next largest one in the Western Aden Protectorate, Hajar Kohlân being the largest.⁴⁰ This site would thus appear to be between 30 and 40 acres, since Hajar Kohlân covers about 50 acres and Shabwa about 20 acres. South of Nişâb there is a hill ruin known as Mariba, near the modern settlement of 'Ain ar-Râṣid.

Wadi Jirdân

East of Wadi Markhah is Wadi Jirdân, flowing northward from the southern mountains (Plate 34). While Philby did not report any ancient irrigation remains, he did report that for a half mile on each side of the wadi and for several miles upstream there was "rather primitive cultivation with shallow gravel spread banks surrounded by low dykes to catch the flood water."⁴¹ The area Philby mentioned represents

³⁵ *Ibid.*, p. 334.

³⁶ R. A. B. Hamilton, *op. cit.*, p. 113.

³⁷ Mrs. Stark, "An Exploration in the Hadhramaut," *Journal of the Royal Geographical Society*, 1887, p. 3.

³⁸ R. A. B. Hamilton, *op. cit.*, p. 113.

³⁹ R. A. B. Hamilton, *op. cit.*, p. 113.

⁴⁰ H. M. J. B. Philby, *op. cit.*, pp. 100-102.

⁴¹ *Ibid.*, pp. 337 f.

about 500 acres on each side of the wadi, and apparently is similar to the territory occupied by the Bal Ḥārith in the lower Wadi Beihān. Very probably there are ancient irrigation ruins in this valley, which Philby did not explore.

Wadi Anṣāṣ

In Wadi Anṣāṣ Philby reported an area $\frac{1}{2}$ by $\frac{1}{4}$ mile square (about 75 acres) which contained numerous fragmentary remains of rough masonry, which were presumably ancient irrigation ruins (Plate 34). Philby relates that they came upon

the remains of a dam with narrow openings apparently intended to let flood-water into the reservoir from the uplands beyond; the curious thing about this dam was that it continued up the slopes on either side to the summits of the ridges and then along them for a considerable distance.⁴²

It would seem that this structure was a fortification or boundary line, rather than a dam, inasmuch as it ran up the slope of a hill. The narrow openings were probably to let the *seil* through, so that the structure would *not act* as a dam. Evidence to substantiate this latter theory is found in several similar structures in Beihān, which were obviously not dams, since the valley part of the wall was nowhere level and the ends ran up the mountain sides. These walls were of uniform height throughout their length, and may possibly have been inclined collectors for deflecting the runoff from a hill into one spot. But the holes in the Wadi Anṣāṣ wall indicate that it could not have served this purpose.

Shabwa

Just west of the ruins of Shabwa (Plate 34), Philby reported a "vast tract which had been the scene of extensive irrigation in the heyday of Shabwa."⁴³ From Philby's sketch map this area appears to cover only between 100 and 200 acres. Philby related that a

central canal could be traced for a considerable distance running about north-west . . . [and that] the sides of the distributaries were slotted to hold sluices which must have been raised or lowered (evidently by hand) according as water was wanted in one canal or another. . . . It was all potentially arable land, though now derelict, with segments of masonry aqueducts here and there, and very numerous mounds of silt, twenty to twenty-five feet high, which appeared to line the sides of a vast rectangle. It was difficult to form any idea whether these mounds represented ruined clay buildings or the remnants of a circuit wall. Some of the mounds bore traces of rough masonry, suggesting houses, and it is just possible that the rectangular wall enclosed a camp or fortress.⁴⁴

From my experience with the ancient irrigation ruins in Beihān it would seem very probable that these silt mounds showing traces of rough masonry are irrigation ruins, and that they probably represent the primary high-level canal system. Philby's photograph of a sluice⁴⁵ is very similar to the secondary right-angle sluices found in Beihān. Philby mentions a "silt cliff" along the Wadi Ma'shar bank and "a large bank of silt" in the bend of the same wadi. This would lead one to believe that the Wadi Ma'shar, as well as the Wadi Sahla and the Wadi Khanaq, were used as water sources for ancient irrigation. It is difficult to see how this silt along the Wadi Ma'shar could be of geological origin, since this would imply a lake covering the desert to the east!

From Philby's discussion of the ancient irrigation remains he discovered in South Arabia, it is clear that he has completely missed the basic principle of these ancient systems. Philby visualizes dams to store water in reservoirs, from which the water was released slowly when needed. In discussing Wadi Markhah Philby states that the wadi was "dammed to impound the floodwater," which was released to the radiating field areas "in turn through sluices in the dam."⁴⁶ In reference to the irrigation ruins in Wadi Anṣāṣ, Philby states that "We came upon the remains of a dam . . . intended to let floodwater into the reservoir from the uplands beyond."⁴⁷ The results of my work in Beihān show that the ancient South Arabians never attempted to store

⁴² *Ibid.*, pp. 112 f.

⁴³ *Ibid.*, opposite p. 112, top.

⁴⁴ *Ibid.*, p. 348.

⁴⁵ *Ibid.*, p. 319.

⁴² *Ibid.*, p. 319.

⁴³ *Ibid.*, p. 112.

water behind dams for irrigation, but built their systems to break up the *seil* and distribute it over as large areas as possible in the most efficient manner. All of the irrigation ruins Philby describes may be interpreted in this light, although there is evidence that the South Arabians did build dams and cisterns for water storage for human and animal consumption.

Bir Hamad

Going farther east towards Hadhramaut, Philby reported that at Bir Hamad there was a series of low stone-covered mounds on a wide sandy plain; these mounds extended to an extensive ruin field.⁴³ Philby believes that the mounds represent a dam thrown across a branch of the Wadi Duhr, but they may represent the remains of an ancient canal.

Hadhramaut

We are indebted to the Misses F. Stark, E. W. Gardner, and G. Caton Thompson for the first systematic study of ancient irrigation in South Arabia. Freya Stark visited Hureidha in 1935 and reported that a very big Sabaean ruin-field existed in Wadi 'Amd, a tributary of Wadi Hadhramaut (Plate 34). On the basis of this, Miss Caton Thompson chose Hureidha as a site for excavation in 1937. The "Sabaean ruin-field" turned out to be merely the rubble ruins of an irrigation system, which Miss E. W. Gardner surveyed (Plate 90).⁴⁴

From circumstantial archaeological evidence Miss Caton Thompson has dated the irrigation ruins as contemporary with the Moon Temple and the tombs which she excavated (the tombs were dated in the fifth to fourth centuries, b.c.).⁴⁵ Every post-Himyaritic site that she examined supplied specimens of fifteenth-century Chinese and Persian wares and ninth- or tenth-century Islamic fragments. On the irrigated plain not a single example of these was found

among the numberless weathered sherds, although she did find on the plain numerous obsidian microliths, cores, and waste, as well as sherds of coarse ware which were contemporary with the tombs and the temple.

In addition to this is the fact that the several sites excavated were in the middle of the deserted plain and their tops were about 4 m. above the irrigated plain. Confronted with this evidence I must agree with her conclusion that the Hureidha irrigation ruins were roughly contemporary with the sites excavated. Since the later phases of the temple belong to the late centuries n. c., the irrigation works would seem to have been used this late. For a further discussion of the Hureidha dating, see Appendix IV.

However, from a comparison with Beihan irrigation ruins (*without* the archaeological evidence presented by Miss Caton Thompson), I should be tempted to date the Hureidha irrigation system much later than she has. She states that the "master canal was distinguishable continuously for over 4 km.; much of the western stretch is ill defined, though unmistakable, marked only by a concentration of pebbles in a 20-m. wide band along its course."⁴⁶ Miss Caton Thompson further states that the probable inlet connection with the main wadi was located 16 km. farther upstream to the west, where a 30-m.-wide canal with 2-m.-high earth walls was evident for 80 m. only. A portion or all of the main wadi was apparently deflected into the take-off canal.

Thus in many instances the actual earth canal walls were traceable at Hureidha. This was never possible in Beihan, for erosion had completely removed the traces of the ancient canals that irrigation tanks built centuries apart were left standing together and were at first glance apparently contemporary. In some cases I could trace primary distribution canals over considerable distances simply by the location of the highest irrigation tanks (which might have been as much as 1 m. above the field level). But I was only able in several instances to locate a secondary canal. The secondary ditches were visible, but there was nothing to indicate where the secondary canals ran.

In the Hajar bin Humaid and Mabbiq areas, the tanks were about 10 m. apart, at Hajar bin the main canal was undoubtedly about 20 m. wide.

⁴³ *Ibid.*, pp. 24-25.

⁴⁴ G. Caton Thompson, *The Tombs and Monuments of Hureidha* (H. F. & G. Witherby, London, 1938), pp. 9-10.

⁴⁵ *Ibid.*, pp. 111, 153.

The secondary canals at Ḥureidha were 4 to 8 m. wide and about 2 m. above the general field level. In Beihān the secondary sluices were apparently at about the field level, the water having been dropped to this level by the big primary sluices. Miss Caton Thompson states that the bottom of the main canal was marked by a concentration of pebbles. All the examples of main canal bottoms found in Beihān consisted of alternating layers of fine sand and clay; no pebbles were found. Thus the gradient in all of the Beihān canals was apparently less than at Ḥureidha. Miss Caton Thompson further states that there were tertiary 1-m.-wide runnels evident. Comparable evidence was rarely found in Beihān, but it appears that the tertiary canals were cut into the field level just as were the secondary canals.

We seem to require a good explanation for the lack of erosion at Ḥureidha if we are to accept Miss Caton Thompson's dating, which puts the final stages of that system at least several centuries before the final systems in Beihān. There is one conclusion that can be drawn from the start: there was obviously less rain water at work on the ancient Ḥureidha field area. The topographical map prepared by Miss Gardner shows that the ancient irrigated area now lies on a pronounced dome in the middle of the valley (Plate 90). South of the area is the deeply entrenched present wadi, and to the north there is a narrow (about 200 m. wide) valley separating the field area from the northern escarpment.

The first time that maintenance of the irrigation system was relaxed, the deflection system for forcing part (or all) of the *seil* from the main wadi into the Ḥureidha take-off would cease to operate. Very probably it was like many of the present-day Hadhramaut and Beihān systems, consisting of a temporary earthen dam thrown up across part of the wadi which was washed out with every *seil*. Thus once the upstream deflecting system failed, the only rain water which would reach the ancient field was from the skies above. Rain water flowing down the cliffs on each side would simply run down the valleys at each side of the old field area. No water would flow across the fields.

In Beihān the very principle of ancient irrigation required that the run-off from the moun-

tains flow over the fields. When the Beihān systems were abandoned, the *seil* still flowed over the fields, but being uncontrolled it scoured the ancient fields, cutting canyons and gullies in the fields and leaving numerous plateaus and buttes of silt. Further, by the principle of secondary and tertiary distribution through ditches cut into the field areas, the ancient Beihān fields were also more susceptible to direct rain, which would run off the individual fields plots and concentrate in the ancient distribution ditches to form a powerful erosional agent. In view of these differences between the Beihān and the Ḥureidha systems, we do not have to assume that the Ḥureidha system is later than the Beihān or that there has been more rain in Beihān than at Ḥureidha since the respective systems were abandoned.

Unfortunately, no details of the construction of the Ḥureidha sluices have been given, so that an exact comparison with the ancient Beihān works is impossible. While I could never have drawn as detailed a map of any irrigation system in Beihān from my surveys (some of which I feel were as complete as Miss Gardner's), there is a basic similarity between the Beihān and Ḥureidha systems: the field plots were laid out on a vast rectangular plan. In this detail both ancient systems differ from the modern irrigation systems carried out in these two areas, for in the modern systems the field plots are arranged in haphazard fashion, with no apparent orientation. In the ancient Ḥureidha system, the field plots were laid out uniformly at right angles to the main canal. At Ḥureidha the ancient irrigated area was somewhere between 1500 and 2500 acres, which is comparable to some of the large ancient areas in Beihān, and about half the size of the area irrigated by the Mārib dam.

Miss Caton Thompson has assumed that all the irrigation ruins on the plain were contemporary. In view of the apparent lack of erosion that has taken place, this would seem to be a justifiable assumption. The only place where there would be a chance of exposing earlier levels would be along the wadi to the south, and in the narrow valley between the field area and the northern escarpment, since this valley may represent recent erosion from the run-off of the northern escarpment. However, while these two areas

might well produce earlier field levels, there would probably be no irrigation ruins, since these areas are on the very extremities of the ancient canal system where no stonework would be expected.

It has been demonstrated that all the visible silt deposits in Beihān are the result of ancient irrigation. Such is not necessarily the case in Hadhramaut, for Miss Gardner has shown that there are apparently huge Pleistocene silt deposits there.³² Thus at Ḥureidha the depth of the silt is not necessarily a measure of the silt accumulated by irrigation. In Wadi 'Amd the silt is 10 to 12 m. thick in places; probably some of the Ḥureidha silt is of Pleistocene origin.

Miss Caton Thompson did not even speculate as to the depth of silt which might be due to ancient irrigation at Ḥureidha. However, from a careful study of the topographical map which Miss Gardner has drawn (Plate 90), it is possible to give an estimate. As was mentioned above, Miss Gardner's map of the Ḥureidha irrigation ruins shows that the ancient irrigated area was on a pronounced dome or ridge in the middle of the valley. Now this is such a strange formation from a geological point of view that one can immediately say that the silt ridge in the center of the valley is an unnatural formation and that therefore it must be due to the accumulation of silt from the ancient irrigation system. The fact that the main canal follows the high point of the ridge substantiates this.

Under natural processes of erosion we should expect to find the central plain of the valley sloping gently toward the wadi bed. We can reconstruct the appearance of the valley before irrigation was started by drawing straight lines between the points where the contour lines start to swing to the east along the northern escarpment and the points where the contour lines meet the edge of the entrenched wadi bed. Now if we observe the elevation of the actual center of the dome above our reconstructed contour lines, we get an estimate of the depth of silt accumulated by ancient irrigation. Summarizing the results of these simple estimates, we have the following:

Reconstructed straight-line contour line from the northern escarpment to the bank of the Wadi	Approximate elevation of dome where straight line contour crosses dome axis	Approximate length accumulated by ancient irrigation
797.5 meters	800.0 meters	25 meters
795.0	799.0	10
792.5	797.5	30
790.0	795.0	50
787.5	792.5	50
785.0	790.0	50
782.5	787.5	50
780.0	787.5	75

Where the canal first enters the irrigated area there are about 3 to 4 m. of silt accumulated and at the lower (eastern) end there are about 6 to 7. While it must be remembered that this is only a rough estimate, the figures definitely show that the central accumulation is greater on the lower part of the fields. This may indicate that the lower area was irrigated much longer than the upper part, or it may only indicate that the lower part got more of each *sai* by being at the extreme end of the system. At any rate, the fact that the lower part of the area shows a more pronounced ridge in the center of the valley indicates that there was less lateral irrigation at the lower end of the system. These figures show that on the average at least 5 m. of silt was accumulated in the center of the valley by ancient irrigation. Actually the deposition due to irrigation is much greater than these figures indicate, since the natural contour lines probably had a gentle western curve when the wadi flowed down the center of the valley.

A temple and a "farmstead" which Miss Caton Thompson excavated were situated on a hill, about 1 m. high and about 200 m. by 350 m., near the main canal in the center of the plain. Inscriptions found in the temple mention the "town of Mağābum." Miss Caton Thompson states that "one would like to be more certain about the locality of this town."³³ But there seems no reason to doubt that it was the 4th *siyāḥ* where the temple was situated. Its area is about a quarter that of Timar, capital of Qaṣrīn, and it is more than three times the size of Ḥajrān Ḥunayd in Beihān. This one is a low hill, and it seems likely that its ruins are still 10 m. below the present level of the area situated by it, since the town probably grew up with the

³² G. Caton Thompson and F. W. Gardner, op. cit. pp. 4-5.

irrigation system. These ruins are over two times the size of the next most likely sites of habitation at Hureidha.

Miss Caton Thompson has summarized the principles of ancient irrigation at Hureidha as follows:⁵⁴

1. Impounding floodwater by means of barrages across the natural channel
2. Releasing it in more or less controlled quantities through sluices
3. Final distribution through
 - i. master canal
 - ii. shorter offsets
 - iii. small sluice gates

Unfortunately Miss Caton Thompson has made the same error as Philby in assuming a dam with impounded floodwaters. She was led to this conclusion by unnecessarily assuming a storage dam upstream from the main canal take-off. About a kilometer upstream from the take off Miss Gardner found a ruined revetment, which apparently acted as a deflector to force the water towards the Hureidha take-off, although Miss Caton Thompson has assumed that this was part of a storage dam: "assuming that a similar structure, for which no evidence now exists, originally projected from the opposite bank, it is likely that sluices and a spillway controlled the gap between the two piers."⁵⁵ While I have not visited the Hureidha ruins, it seems likely that the Hureidha system was built for the rapid distribution of a *seil* through the main canals and sluices with fixed openings. It must be remembered that a *seil* can come at night as well as in daylight.

If there were a dam as Miss Caton Thompson suggests for impounding and releasing floodwaters in more or less controlled amounts, there would have probably been considerable deposition of silt back of the dam over the period of operation when the silt, kept in suspension by the speed of the current, precipitated in the slow moving water backed up behind the dam. With each *seil* the deposit behind the dam would rapidly increase and the storage capacity of the dam would soon decrease to zero, at which point the dam would have to be increased in height if it were to store any water.

⁵⁴ *Ibid.*, pp. 10 f.

⁵⁵ *Ibid.*, p. 13.

Miss Caton Thompson has given data proving that there was never any dam to impound and then release the *seil* in controlled amounts. In the first place, there were apparently no silt deposits on the upstream side of the single revetment which Miss Gardner found. If there were such a deposit the *seil* would have cut a course through the center of it and some parts of the lateral portions would certainly be evident today, in view of the lack of erosion on the Hureidha silt. More important is the fact that much of the 4 km. of canal bottom evident at Hureidha 16 km. down from the take-off was covered with a concentration of pebbles. Had there been a dam actually impounding the water, the pebbles would have been deposited behind the dam and certainly would not have reached Hureidha. This fact alone seems to be definite evidence that swiftly moving water from the main wadi was deflected into the take off canal, where the velocity was sufficient to carry the pebbles. The final evidence is the rather considerable amount of silt deposited on the Hureidha fields through irrigation. This, coupled with the lack of silt deposits behind the revetment, gives rather positive evidence that there was no dam for controlled storage of water.

There does seem to be evidence that there may have been a dam near the take-off for the Hureidha irrigation canal, but of an entirely different nature from that suggested by Miss Caton Thompson. The evidence is circumstantial and is based on the topography of Hureidha. The topographical map shows that the present bed of the wadi runs hard against the southern cliffs (Plate 90). The natural course of the wadi might be more towards the center of the valley between the two cliffs. Therefore it is probable that the silt deposited by the ancient irrigation has forced the wadi to the south, out of its natural bed.

This might mean one of two things. It is possible that the wadi was gradually forced to the south as the level of the field area rose. Or one might assume that from the start the whole of the Wadi 'Amd was initially forced into the main irrigation canal. It seems that only the latter case can explain the existing facts. When the irrigation system was abandoned the wadi found a low course down which to flow. This course was between the elevated fields and the cliffs. In almost a half a dozen places in Beīhān tribu-

tary wadies today flow close to the mountains because ancient agricultural silt covers the central part of the valley where the wadi originally flowed. It is possibly more than a coincidence that at Hureidha the present wadi swings abruptly towards the center of the valley after the irrigation silt starts to decrease. Above the ancient irrigated area the present wadi is also located more towards the center of the valley.

It would seem that in all probability a simple earthen dam was thrown up across Wadi 'Amd to divert the whole of the *seil* into the take-off canal. Certainly there would be no difficulty in constructing an earth dam of sufficient magnitude to divert this wadi. Exactly where the revetment discovered above the take-off fits into the picture is not clear. Perhaps several revetments were placed partially across the wadi to direct the water towards the canal opening and protect the main dam from erosion.

Miss Gardner has stated that there are Pleistocene terraces in the wadi bed at Hureidha and claims to have identified 3-, 5-, and 10-m. terraces at Hureidha and other places in South Arabia.⁵⁶ It would seem from the above discussion that the present channel of the Wadi 'Amd near Hureidha dates from about the start of the Christian era, and thus none of the erosion on the valley floor can be ascribed to Pleistocene times. In view of the fact that the irrigation in ancient times deposited 5 to 7 m. of silt at Hureidha of the same type that is found in the rest of Hadhramaut, it would seem that one cannot be dogmatic about classifying all such silt as of geological nature, as has been done in the past. Certainly other similar silt deposits in Hadhramaut are the result of ancient irrigation.

REASONS FOR ABANDONMENT OF ANCIENT IRRIGATION SYSTEMS

There is little doubt that the whole of the Middle East had a wetter climate in Pleistocene times than at the present. Since Pleistocene times there has been a general desiccation over the

whole area, although there is considerable difference in opinion as to how much of this change has taken place in historical times. Frankfort estimates that in southeastern Iran (to the north-east of the Arabian peninsula) progressive desiccation marked the period from about 7000 B.C. on, turning the plateaus to desert and making the valleys of the great rivers inhabitable by forming meadows and shrub lands out of the swamps and mudflats.⁵⁷

Wright has correlated the geology of northeastern Iraq with four ancient sites and has been able to show that the area has been dry since at least 5000 B.C., with the exception of a minor pluvial in the first millennium B.C. which may possibly be correlated with the "Sub-Atlantic" cold phase.⁵⁸

We have a more complete climatic picture for Egypt (to the west of the Arabian peninsula), which has been summarized by G. W. Murray.⁵⁹ Regular rainfall ceased over Egypt below the 500 m. contour sometime around the close of the Plio-Pleistocene period (about three-quarters of a million years ago). The earlier European glaciations seem to have left the Egyptian deserts dry, but the long span of drought was broken by at least two rainy interludes. In the first the deserts, both east and west of the Nile, were habitable in Middle Palaeolithic times, while during later times, from 8000 to 1000 B.C., there was light rainfall. In lower Nubia there has been no continuous rainfall since before 3500 B.C. Here Predynastic bodies have been found buried in the sand without any dehydrating material. Their state of preservation is so remarkable that not only do the eyes remain, but every detail of their gross anatomy can be identified in a dried and shrunken condition. A crowbar of copper, assigned to the Old Kingdom (c. 2850-2200 B.C.), was found on the surface of the Nubian desert in perfect preservation and brownish-red in color. When moved to the damper climate of the Cairo Museum it soon turned green!

Huntington was a strong supporter of the theory of wetter climatic conditions in Palestine

⁵⁶ H. Frankfort, *The City of Uruk and its Environs* (London, 1934), p. 56.

⁵⁷ H. Frankfort, *The City of Uruk and its Environs* (London, 1934), p. 56.

⁵⁸ G. W. Murray, "The Egyptian Climate," *Geographical Review*, 27 (1937), pp. 186-211.

and northern Arabia in classical times.⁶⁰ However, subsequent archaeological investigation has proved that Huntington's theory as applied to Palestine is not consistent with the facts. Albright has given examples of this.⁶¹ Huntington used numerous Roman-Byzantine cities in the Negeb in southern Palestine, where today there is not a single village, as evidence of heavier rainfall in ancient times. Archaeological excavation showed that the ruined cities flourished over a period of many centuries, so that at any one period there were apparently never more than a few towns existing. Huntington further cited the wealth of abandoned water channels in the oasis of Engedi as proof that there was more water available in Roman times. However, competent investigation has shown that the channels had to be abandoned, not when the rainfall decreased, but when the soil became covered with a crust of alkali. In other words the surviving channels belonged to many different periods, and only a tiny fraction of these were ever used together.

There are a very few scholars who still support Huntington's theory of a wetter climate in Arabia in classical times. Foremost among these is S. A. Huzayyin, who made a trip to Yemen and afterwards claimed to have found evidence leading to the conclusion that there were recent wet periods.⁶² However, he has never presented the evidence. In a later work Huzayyin proposes some fantastic theories, in which he claims to have detected a number of drought periods, the final desiccation taking place in the third and fourth centuries A.D.⁶³ Huzayyin uses these droughts to explain revolts and overthrows in ancient South Arabia.

The real heart of the Nabataean kingdom was in southern Transjordan. It is estimated that today there are only about a third as many people living in Transjordan as there were in Nabataean times. Since it is difficult at first sight to see how the country could support many more people, one might draw the conclusion that

⁶⁰ E. Huntington, *Palestine and Its Transformation* (Cambridge, 1911).

⁶¹ W. F. Albright, *From the Stone Age to Christianity* (Baltimore, 1940), p. 73.

⁶² S. A. Huzayyin, "Egyptian University Scientific Expedition to South-West Arabia," *Nature*, Sept. 18, 1937, p. 513.

⁶³ S. A. Huzayyin, *Arabia and The Far East* (Cairo, 1942), p. 36.

considerable desiccation has taken place in the last several thousand years. Glueck has shown by the following statement that this conclusion would not be justified.

It has been demonstrated that the part of the Nabataean kingdom which is located in southern Transjordan, was highly organized and intensively settled. It prospered partly because of the fullest possible agricultural use of the land. . . . Some areas were marked with settlements, where never before nor since the time of the Nabataeans has the soil supported or helped sustain a sedentary civilization. . . . In the desert they could survive where none others could live because of their skill in conserving water.⁶⁴

Proof of this seems to be the fact that when the abandoned tunnel-wells of Transjordan are cleaned out (as the late King Abdullah's engineers have done to some) they commence to function as they did several thousand years ago. Certainly this does not indicate a falling water table.

I have previously discussed desiccation in Arabia.⁶⁵ It seems certain that in central Arabia the water table has fallen considerably in the last thousand years or so. However, this may well be caused by a decrease in the pressure in the artesian stratum due to excessive drainage from wells on the Persian Gulf coast of eastern Arabia and on Bahrein Island. But there is no proof that the climate has changed appreciably in the last 2000 years anywhere in the Arabian peninsula.

This work on Qatabanian irrigation does not indicate that the climate was necessarily any wetter 2000 years ago. It is interesting to note that the modern Beihânis have about the same acreage under cultivation as did the Qatabanians, although they use less efficient means of irrigation. The magnitude of the ruined irrigation works could be given as evidence that there were wetter times 2000 years ago, if one assumed that water was flowing all the time in the systems. However, the evidence indicates that these works were primarily for *seil* irrigation. The fact that about the same acreage is under cultivation today as there was 2000 years ago would seem to indicate that, if anything, the present is wetter

⁶⁴ N. Glueck, "Nabataean Syria," *Bulletin of the American Schools of Oriental Research*, no. 85 (1942), pp. 2-7.

⁶⁵ R. LeB. Bowen, Jr., *The Arabian Necropolis of Ain Jawan* (New Haven, 1950), pp. 35-43.

since modern irrigation methods are less efficient. However, that does not necessarily hold, either, since modern production per acre is probably less. I did find certain evidence that could be used as an argument for a wetter past, such as small freshwater clams and snails in the agricultural silt, but other explanations can be found to explain the presence of these without assuming a wetter climate.

Just as the work on Qatabanian irrigation does not indicate that the climate was then any wetter, so also it does not give any indication that the irrigation systems had to be abandoned because of climatic changes such as a change in rainfall or a lowering in the water table. There is likewise no evidence to indicate that any of the systems had to be abandoned because of silting of fields or canals. This silting was a natural result of the method of diverting and distributing the water of the tributary wadies into the fields (really controlled alluvial fans). While some of the silt deposits built up to rather astounding heights above the original wadi beds, the canals rose with the fields, and their entrances automatically backed upstream as the whole system rose in elevation. The ancient irrigation works of Mārib were similar to those of Beihān in that silting tended to raise both the fields and the inlet canals so that silting was not an insoluble problem, although the final collapse of the Mārib dam may have been influenced by the general silt accumulation behind the dam.

At Hureidha, however, the situation was considerably different from that at Beihān, for there the water for irrigation was taken from the main wadi. As the silt on the fields rose there would be less and less gradient for the flow of water from the take-off to the fields, until the point was reached when the take-off would have to be moved upstream or the system would have to be abandoned. The Hureidha take-off was apparently 16 km. upstream. While this may have represented the last of several take-offs which were moved farther and farther upstream, Miss Caton Thompson does not report any other canal take-offs closer to the fields. Thus the original planners may have had the insight to build the take-off far enough upstream so that it would be a long time before it was necessary to relocate the entrance. However, the fact remains that the Hureidha system seems to have differed from most of those in ancient Qatabān in that there

would come a time when the canal entrance would have to be moved farther upstream or the whole system would have to be abandoned.

Since the gradient in the last 1 km. of the Hureidha canal was about 2.4 m. per km. as compared with only 3.2 m. per km. in the wadi bed beside it, there was still plenty of gradient left in the canal. The topographical map also shows that there was more than enough gradient left between the main canal and the fields on each side. Thus the Hureidha irrigation system appears to have been in a healthy condition when it was last used, and we can say confidently that neither silting of the fields nor silting of the main canal had anything to do with the abandonment of the irrigation works.

We thus have the results from three extensive areas of ancient abandoned irrigation projects in South Arabia. The Hureidha system was apparently abandoned first, not being used after the last centuries B.C. The Beihān system examined in detail at Hajr bin Hunaid was apparently used into the third century of the Christian era. The famous Mārib dam and works were in use toward the end of the sixth century A.D. and may have been used down to Islamic times. We can say with certainty that neither silting of the canals nor silting of the fields had anything directly to do with the abandonment of any of the works. We can also say that it is not probable that climatic changes were involved. Therefore we are left with the conclusion that the major irrigation works in South Arabia were progressively abandoned because of changes in social, political, or economic conditions.

It is tempting to suggest that the progressive abandonment of large tracts of formerly irrigated land in South Arabia resulted from a decrease in export trade, specifically in frankincense and myrrh. The South Arabian kingdoms were well known to the Greeks and the Romans. In the second century B.C. Agatharchides wrote "For no nation seems to be wealthier than the Sabacans and Gerhaeans, who are the agents for everything that falls under the name of transport from Asia and Europe."¹² There is little doubt that during Roman times the demand for incense increased enormously. Pliny wrote that

¹² Agatharchides, in Ptolemy, *Geographica*, 4, 8, 10; trans. by F. L.凭, Vol. II, p. 23.

the demand for frankincense increased so much in the Roman Empire that the gum was gathered twice a year and the lumps were not given a chance to grow to maturity. He also related that the amount consumed at Poppaea's funeral (A.D. 66) was more than the whole annual production of Arabia.⁶⁷

The *Periplus* relates that the Roman emperor sent gifts to the Sabaean king: horses and asses, valuable clothing, and gold, silver, and bronze work.⁶⁸ Presumably this was to assure commercial privileges and perhaps also the protection of Roman merchants. In the third century A.D. the tremendous economic contraction which occurred in the Mediterranean region abruptly led to a shrinkage of imports of oriental goods. In addition to the effects due to this cause, we have continuous drying up of the demand for frankincense and myrrh as Christianity replaced paganism, for the early Christians objected to these pagan odors. In India one finds quantities of Roman coins and pottery in the first and second centuries A.D., but there is an almost complete absence of these coins after c. A.D. 215.

The capital of Qatabān was Timna'. Archaeological excavation has shown that the city was destroyed by fire about the beginning of the Christian era. Since inscriptions of the kings of Hadhramaut are found in Beihān for the first time during this period, it is reasonable to suppose that Beihān was subdued by the Hadhramis. Inscriptions become very scanty in Beihān after the end of the Qatabanian kingdom, and they completely disappear after the early second century A.D. A Hadhrami inscription from Beihān dated in the early second century A.D. mentions irrigation works undertaken in the district of Wa'lān by a king of Hadhramaut. It would certainly seem to be more than a coincidence that the abandonment of certain of the ancient irrigation works in Beihān can be dated in the third century A.D., when it is known that the demand for incense abruptly decreased.

There is also an explanation for the long continued use of the irrigated area at Mârib. Strabo related that when Gallus reached Mârib, the incense land still lay two days' journey farther.⁶⁹

⁶⁷ Pliny, *op. cit.*, xii, 32 and 41.

⁶⁸ The *Periplus of the Erythraean Sea*, translated and annotated by W. H. Schoff (New York, 1912), pars. 16, 21, 23, 24.

⁶⁹ See note 24 above.

Thus the inference is that incense was not grown at Mârib. The *Periplus* relates that the region now occupied by Yemen produced a moderate amount of grain and a great deal of wine, and for this reason little grain or wine was imported.⁷⁰ Thus it seems consistent with the evidence at hand to assume that the Mârib delta grew grain or other footstuffs. Certainly this is indicated in the Qurân by the mention of the "two gardens" at Mârib.

The maintenance of any of the *seil* irrigation works in the three major areas discussed required the continual co-operative effort of the interested communities. A prerequisite for this was obviously a stable and authoritative state. Albright points out that in ancient Egypt and Mesopotamia the priests were forced to make religious sanctions in cases of lack of co-operation, and in later times the priests had to take over the upkeep of irrigation systems from any state which had demonstrated its weakness.⁷¹ It seems that the same relation must have existed in South Arabia between the priests and the co-operative supervision of the maintenance and the building of the irrigation works. It also seems that the Abyssinian conquest may have sounded the death note for some of the huge irrigation systems which were still in existence, for the whole order of religious supervision would of necessity have been abandoned. This may well be what happened at Mârib.

ORIGINS OF IRRIGATION

In surmising the origins of ordered systems of irrigation in South Arabia, Miss Caton Thompson suggests that the earliest experiments were carried out in valleys where there was a perennial supply of water from either springs or sub-soil drainage.⁷² She states that probably this all arose and evolved in Arabia under foreign inspiration, either direct or indirect. As evidence for this she cites the Persian *qanat* which are seen

⁷⁰ *Op. cit.*, par. 28.

⁷¹ W. F. Albright, *op. cit.*, p. 104.

⁷² G. Caton Thompson, *op. cit.*, pp. 9-10.

on the coast and in Yemen, but points out that it has yet to be shown when these were introduced. She shows that all the perennially watered wadis (Marib, Manar, and Hajar) flow directly to the sea, and thus were handy for foreign influence. She then suggests that once the techniques were mastered with perennial water, they were transferred to and practiced in the dry wadis. However, it does not seem that this was necessarily the case.

In discussing the origins of agriculture, Frankfort shows that while irrigation may have been one of the features of the original Neolithic agricultural complex which spread from the Near East, there is no reason to suppose that it was.¹² The main reason is that today many modern primitive groups, isolated in backwaters of civilization, under conditions similar to those that existed in the Nile Valley and Mesopotamia when agriculture was first being developed, proceed without irrigation.

Borchardt relates that in Nubia the Bedouins, semi-Hamitic nomads, sow and harvest durrah in an extremely simple manner:¹³ In early summer large torrents flood parts of the country with 2 to 3 ft. of water, which on subsiding leaves a thick mud similar to that left by the Nile. As soon as the water has withdrawn the Bedouins sow their seed by dibbling holes in the mud and throwing some seed into each. After the harvest is gathered the nomads return to their pastoral duties.

Newberry relates that the Hamites living between the Nile Valley and the Red Sea sow a little barley or millet after a rainfall, pitch their tents and wait for the grain to ripen, harvest the grain, and then move on with their flocks.¹⁴ In Wadi Beidha the Bal Harith Bedouins would have settled in the lowest part of the wadi, carry on small dry farming planting in the wadi bed after a rain, as do many other Arab groups in South Arabia.

For ever cited above are dry farming as reported. It never even occurred to anyone that could logically make the next step of the development of agriculture. He got up and he cut down a wadi bank to trap a small

its silt. When the silt dried up, he plowed his crop. The reason given for this development was the realization that crops seemed to thrive in the alluvial mud, and that this silt-giving silt was being washed away and deposited. It seems that this first step must have been the start (and inception) of irrigation, for once man took up the first dam across a wadi to get some alluvial mud in which to plant a crop, the development of self irrigation systems similar to those in Beidha and at Marib was only a matter of evolving more complicated and bigger works.

Perhaps much of the development after man first dammed his small wadi was accidental or a result of the natural growth of his mind invention. Assuming that the wadi was small enough so that he was able to build a dam which would hold all the silt, it would not be long before the area behind the dam was silted up to such an extent that the soil would now be above the banks of the original wadi. As he increased the height of the dam the silt would gradually cover the lateral areas of land which used to be divided by the wadi.

There can be little doubt that the invention of this first dam occurred in some region where there were wadis which were filled with water only part of the time and were dry the rest of the time. Certainly man did not invent the dam in any area where there was a permanent stream or river, since he did not have the knowledge or construction to build under water. Moreover, damming such a water source would have had little or good. The inventors never constructed dams on perennial rivers. Man's record of until modern times only one dam was constructed in Egypt for the purpose of storing water.¹⁵ He notes that in the Ptolemaic Age of 237 to 221 B.C. a dam was built across Wadi El-Matruh for the purpose of holding water. The dam was broken and the water of the basin might because the earth was not particularly well drained was too great. The level of ground is about 1000 feet above sea level.

While the inventors of the first dam may have placed it in a wadi which became dry only for the season, it is likely that the first dam was probably built for the storage of water for irrigation purposes. This is the most logical explanation for the first irrigation system.

¹² Frankfort, *Origins of Civilization*, p. 112.

¹³ Borchardt, *Archaeological Survey of Nubia*, Vol. I, p. 112.

perennial stream or river with which to experiment. The first canal was without doubt simply a ditch. To dig a ditch did not really require invention, for early man was surrounded by the principle, wadi beds, gullies, and the like. But the idea did have to be put to practical use. Many primitive peoples living near perennial water have dug ditches to lead the water away from the river into fields. This was the principle of the so-called "basin irrigation" of ancient Egypt.

In the Great Basin of western North America the Indians did not cultivate, but simply collected, wild plants and grasses. Forde relates that in Owen's Valley several groups, realizing that wild plants become more luxuriant with abundant water, diverted snow-fed streams from their narrow channels over the fields in which the plants grew wild.⁷⁷ In the spring, before the streams rose with the melt-water, a dam of boulders, brushwood, and mud was thrown across a stream. Then ditches were laboriously cut to lead the water from above the dam into the fields. No attempt at planting or working the soil was made. Here we have a simple dam and dispersing canal.

Thus it seems that man's first experiments in irrigation were in harnessing the temporary abundance of water characterized by the flood waters filling dry wadies after rain in arid climates. In developing such dry farming man unconsciously produced a system that was free of most of the inherent defects of river, and more particularly of well, irrigation. Land under *seil* irrigation never needed fallowing, and crop rotation was unnecessary, since each rain brought down a new deposit of rich silt. When land is irrigated with well water, or other underground water, there is little problem of sediment increasing the height of the fields, but with time salts tend to concentrate in the top layers of the soil where the water is continually evaporated. In *seil* irrigation this is obviously not a problem, since the water is rain water with a minimum amount of dissolved salts, and since new soil is brought down with each rain.

The one bad feature about *seil* irrigation is that it could possibly lower the water table. It is usually supposed that irrigation inherently in-

creases the height of the water table. But if the sediments that accumulate on the fields impede the flow of water through them, as the silt in Beihān appears to do, the majority of the water from a *seil* would be evaporated from the field surfaces before it had a chance to soak through the thick silt deposit and reach the sand and gravel of the former wadi. Thus the general water table in the main wadi would be lowered by this process.

It should not be implied that we are assuming that this process of *seil* irrigation was developed in South Arabia, for we are not. It seems probable that these principles were developed in the Fertile Crescent in Chalcolithic times (*c.* 4500 to 3000 b. c.), prior to the development of the formal irrigation systems in the two areas which used the waters of the great perennial rivers. It does not seem that the South Arabian systems can be older than the second millennium b. c., and therefore they could not have played a part in the great pioneer civilizations to the north. However, since the South Arabian *seil* irrigation systems are unique in their size and organized planning, the South Arabians must be credited with developing primitive *seil* irrigation to its highest known peak.

Albright has shown that the true nomadism of the Arab as we know it today is conditioned wholly by the domestication of the camel, an event which undoubtedly took place in the late second millennium b. c.⁷⁸ Earlier "nomads" were at best ass-herders with vastly restricted scope of movement, and they could not live in the true desert.

It seems to be more than a coincidence that both the domestication of the camel and the origins of developed *seil* irrigation in South Arabia appear to have taken place some time in the late second millennium b. c. This simultaneous development may have led to the initial settling of some previously unsettled wadies bordering the Ramlet Sabatein-Jirdān, Markhah, Beihān, Harīb, and Dhāna—but it is too early to say with any certainty. A possible indication that some of these valleys may have been settled

⁷⁷ C. D. Forde, *Habitat, Economy and Society* (London, 1934), p. 35.

⁷⁸ W. F. Albright, *op. cit.*, p. 120. The chronology of the domestication of the Arabian camel has now been thoroughly studied by Reinhard Walz, *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, 101 (1951), pp. 29-51; 104 (1954), pp. 47-50; *Actes du IV^e Congrès International des Sciences Anthropologiques et Ethnologiques*, Vienna, 1952, III (1956), pp. 190-204.

late (perhaps late second millennium B.C.) is shown in the early forms of the Qatabanian script. Jamme states that the early Qatabanian inscriptions prove that the original Qatabanians were of Sabaeen origin.⁵² However, Albright does not admit that this proves that the original Qatabanians were actually Sabaeen settlers, for he refers to the "Sabaeen domination of Qatabān" at this early date.⁵³

The earliest known examples of Himyaritic script are found in certain archaic graffiti from Beihān and Mukeiras which go back at least to the ninth or probably to the tenth century B.C.⁵⁴ It is extremely interesting to note that in Beihān these are found on the rocky walls of Wadi

⁵² A. Jamme, *Pièces épigraphiques de Heid bin 'Aqil* (*Bibliothèque du Musée*, Vol. 30), Louvain, 1952, pp. 171, 190.

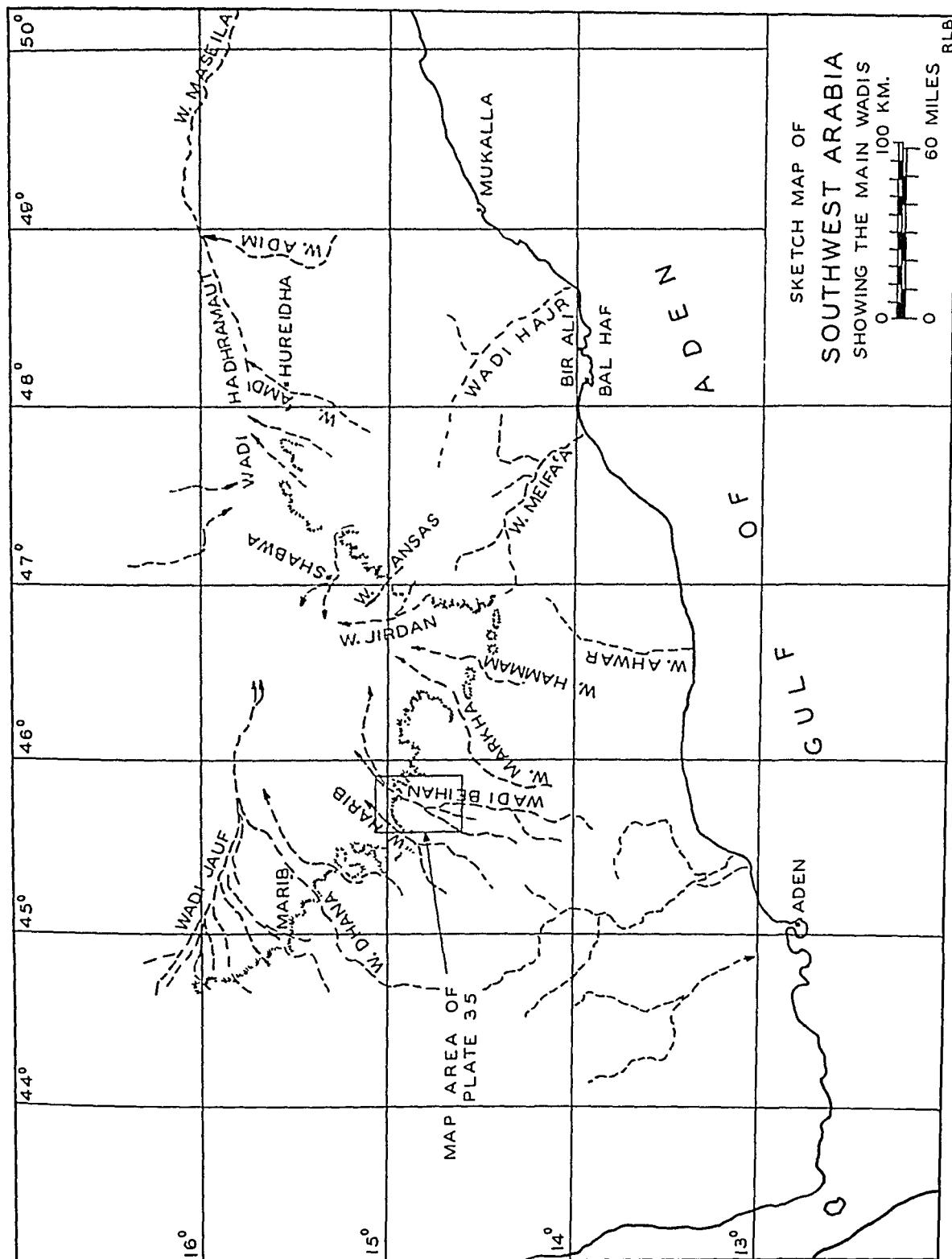
⁵³ W. F. Albright, "The Chaldaean Inscriptions in Proto Arabic Script," *Bulletin of the American Schools of Oriental Research*, no. 128 (1952), p. 15.

⁵⁴ See A. Jamme, "An Archaic South-Arabian Inscription in Vertical Columns," *Bulletin of the American Schools of Oriental Research*, no. 137 (1953), pp. 32-38.

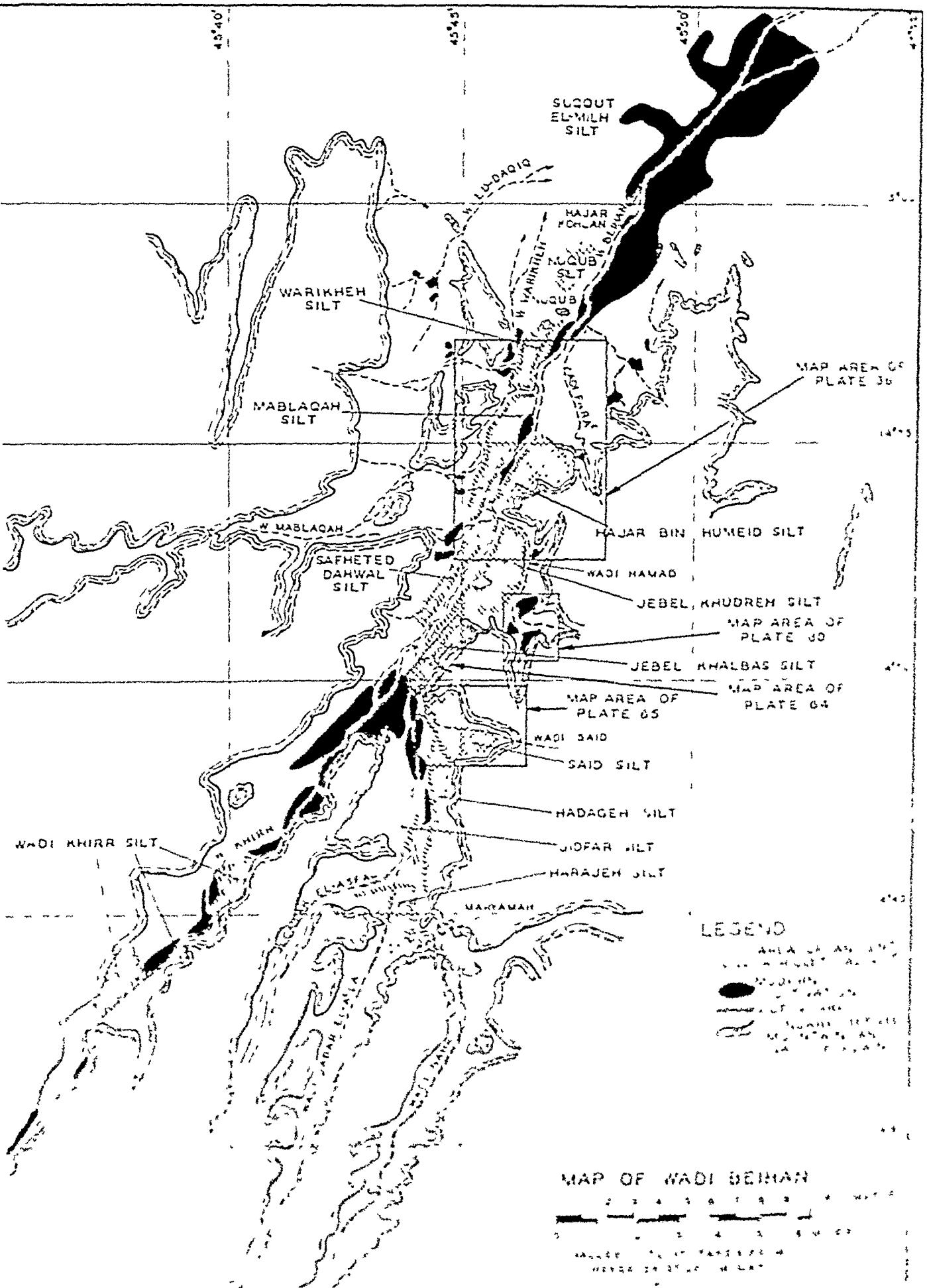
Fara', where there is a perennial spring and several pools of water. Today the sheep herders use this water continually, and from the enormous number of graffiti on the canyon wall it seems that it was used similarly in ancient times. Thus the first settlers of Beihān were perhaps seminomadic, and probably did not possess the technique of the finally perfected *seel* irrigation.

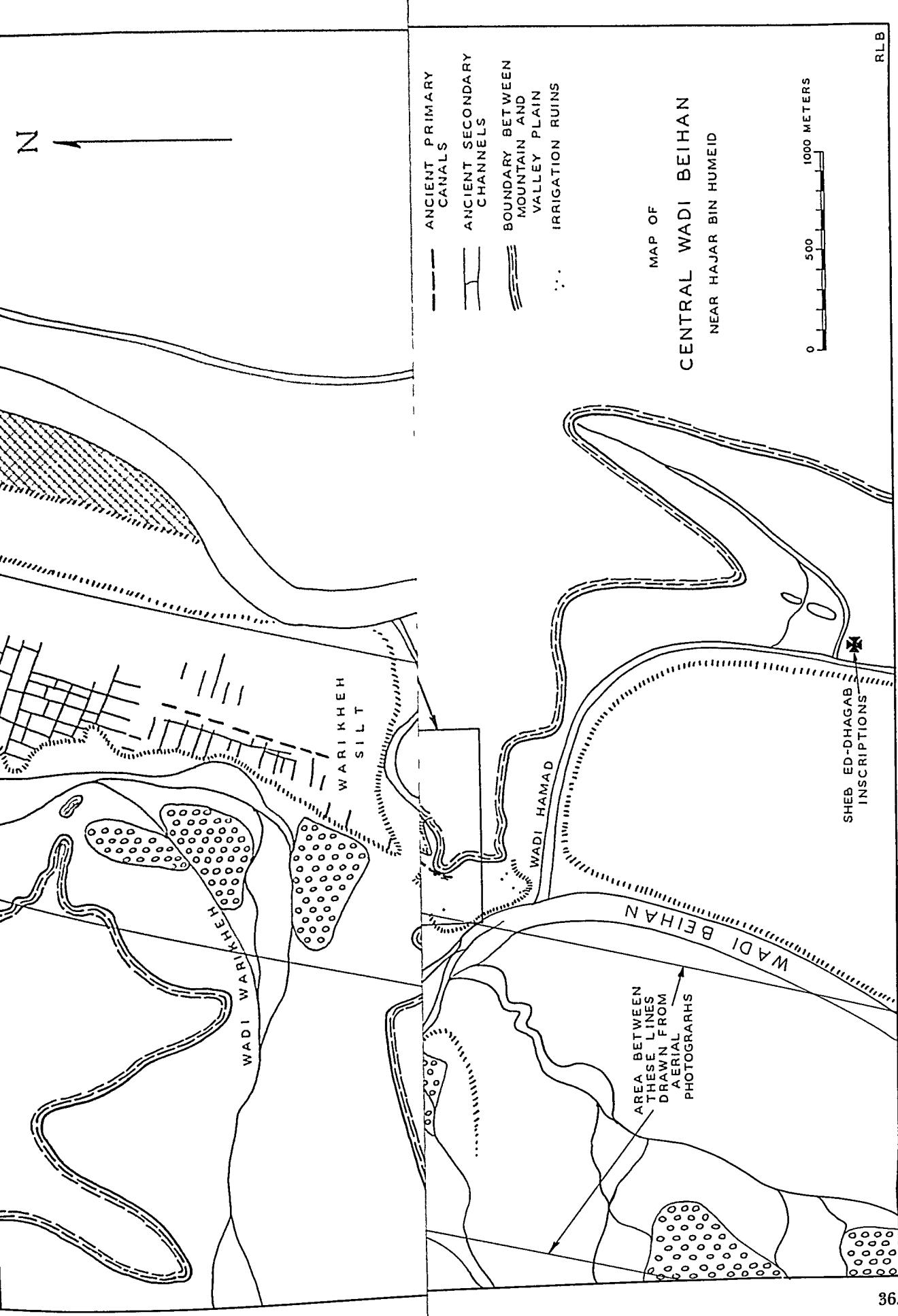
At any rate it seems certain that early in the first millennium B.C. there was a Sabaeen trading hegemony, and possibly a commercial empire of sorts, covering the entire southern and western parts of Arabia.⁵⁵ This commercial empire was possible only through the domestication of the camel and the development of *seel* irrigation. The perfection of irrigation in turn was possible only through a skillful knowledge of building techniques. It would seem, therefore, that all these events took place in South Arabia sometime in the late second millennium B.C.

⁵⁵ W. F. Albright, *op. cit.*, p. 45.



34. Sketch map of southwest Arabia showing all wadis discussed in the text. Wadi Beihān is one of the longest wadis running north into the desert area. All wadis appear to flow towards Wadi Hadramaut.





IN

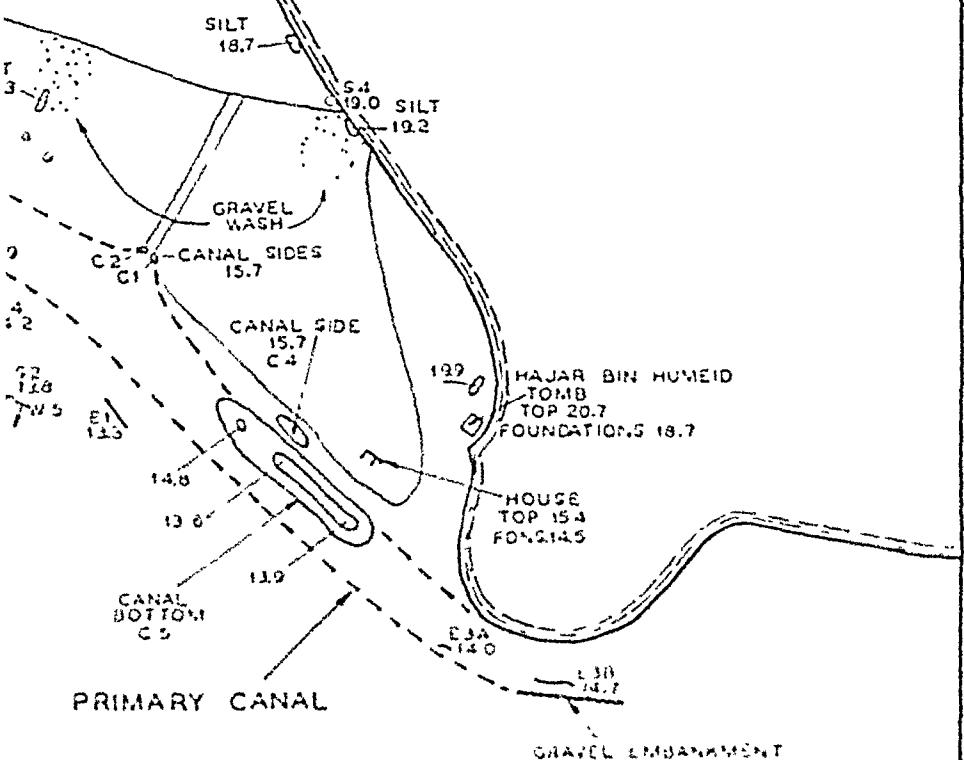
MAP OF THE
HAJAR BIN HUMEID AREA

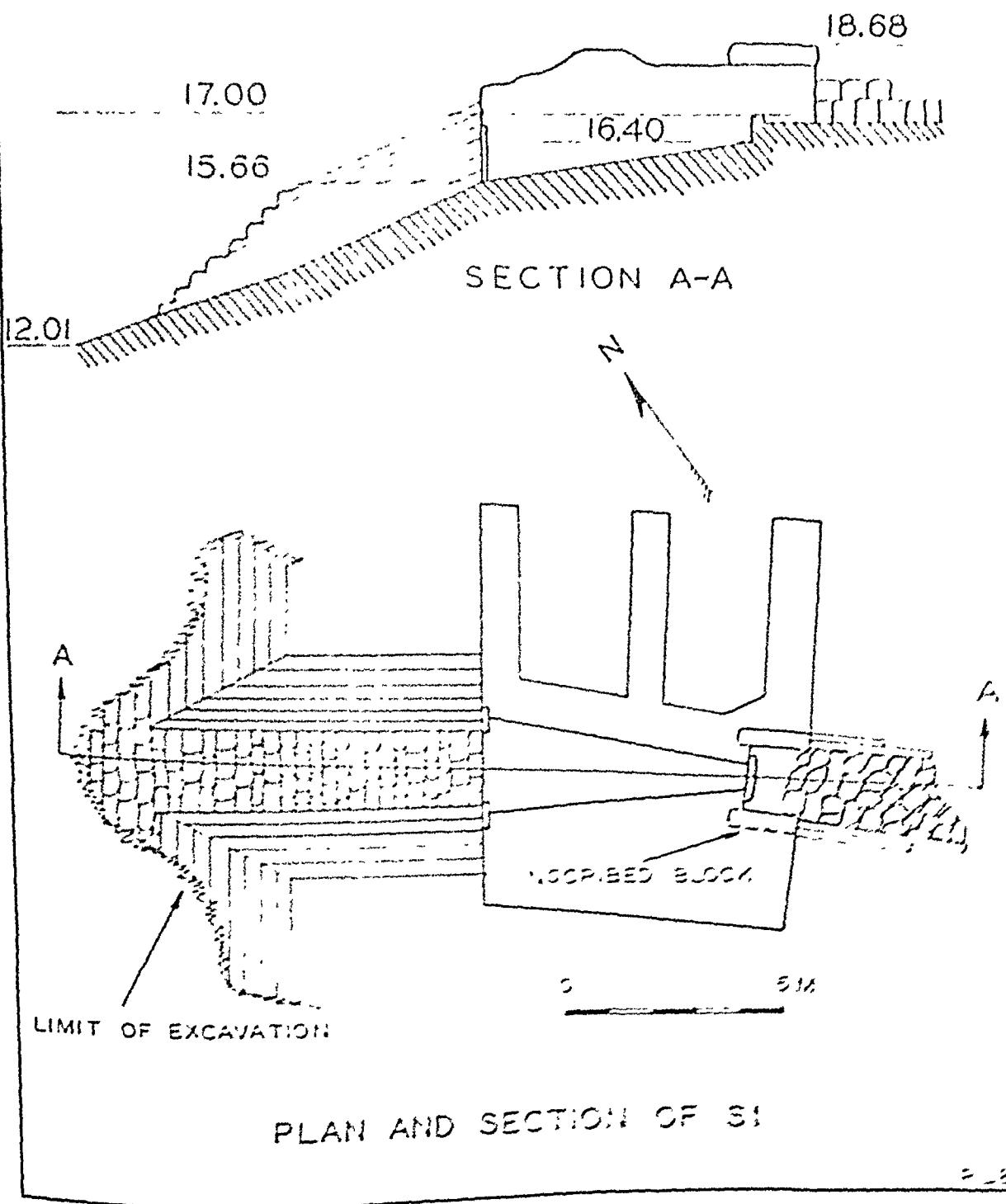
LEGEND

- o IRRIGATION RUINS
- RIGHT ANGLE SLUICE OR DROP
- ↗ ANGLE SLUICE

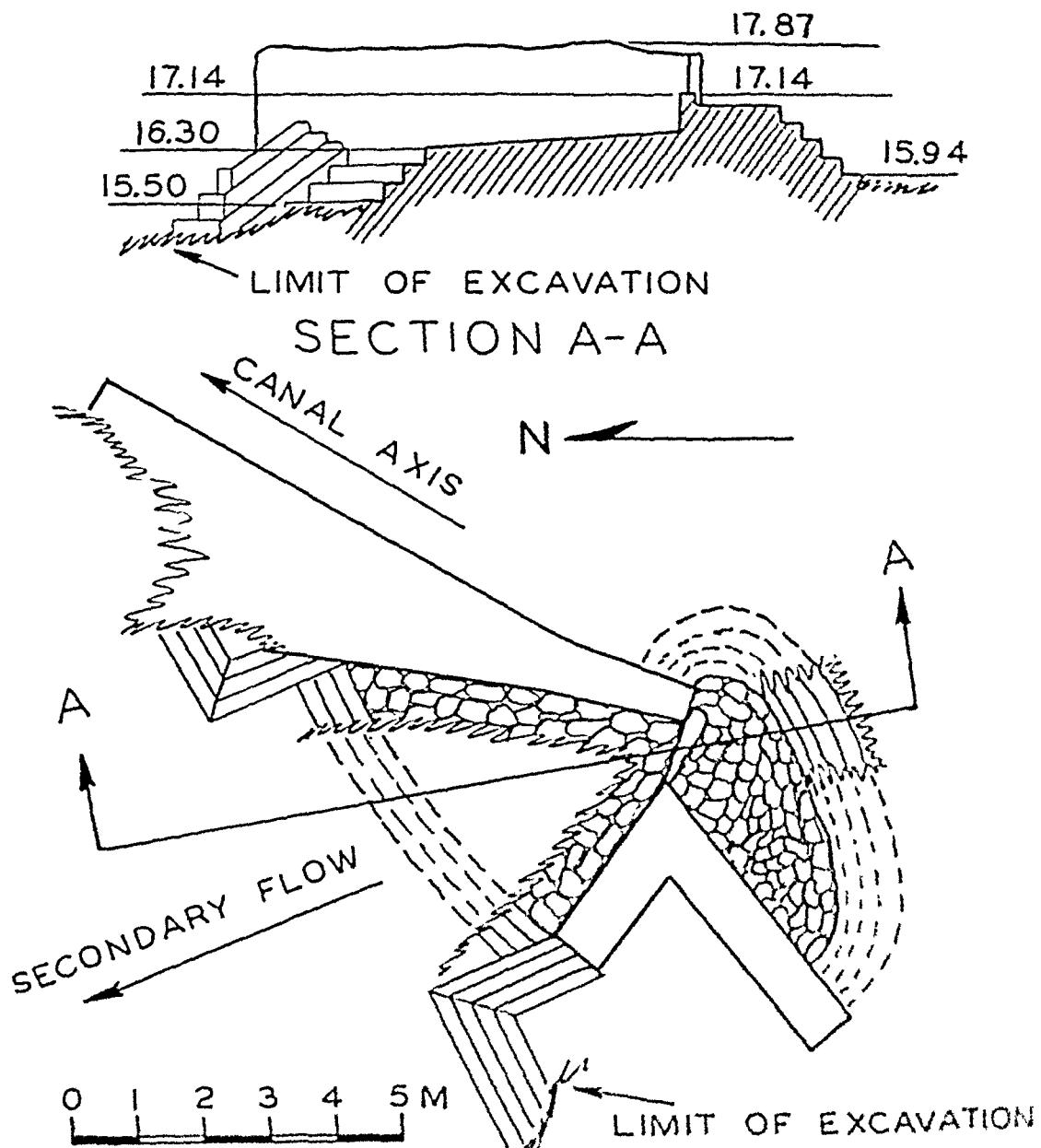
0 50 100 150 200 METERS

FIGURES REPRESENT ELEVATIONS
OF TOPS OF IRRIGATION RUINS
IN METERS ABOVE DATUM





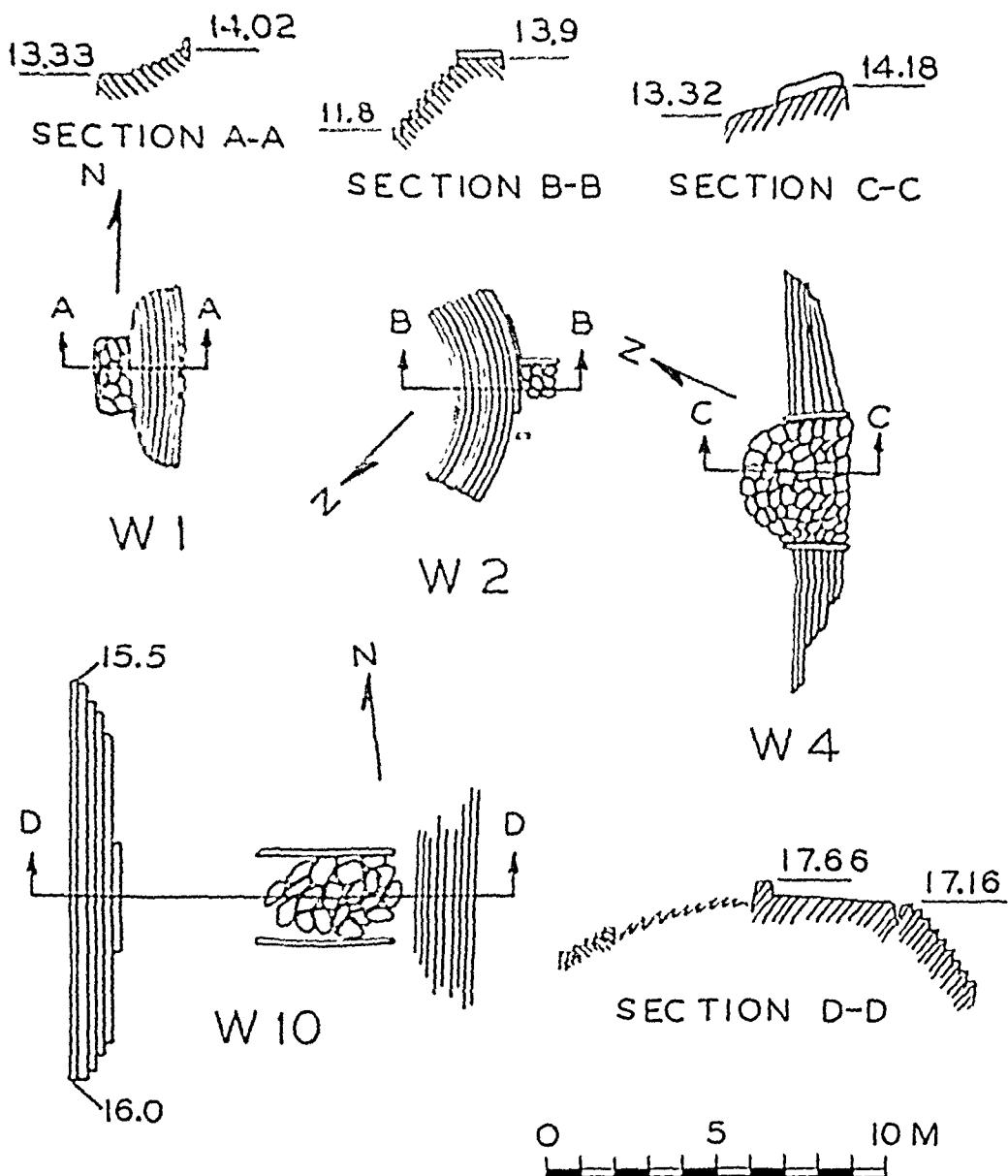
33. Plan and section of large irrigation works S1 built in the primary canal. This is a typical right angle dam, discharge being over stones and sand. The finished work, now dried up, appears to consist of small terraces.



PLAN AND SECTION OF S18

RLB

Fig. Plan and section of S18, a typical large-angle drain used in the primary canal. The faces which contacted the water were plastered.



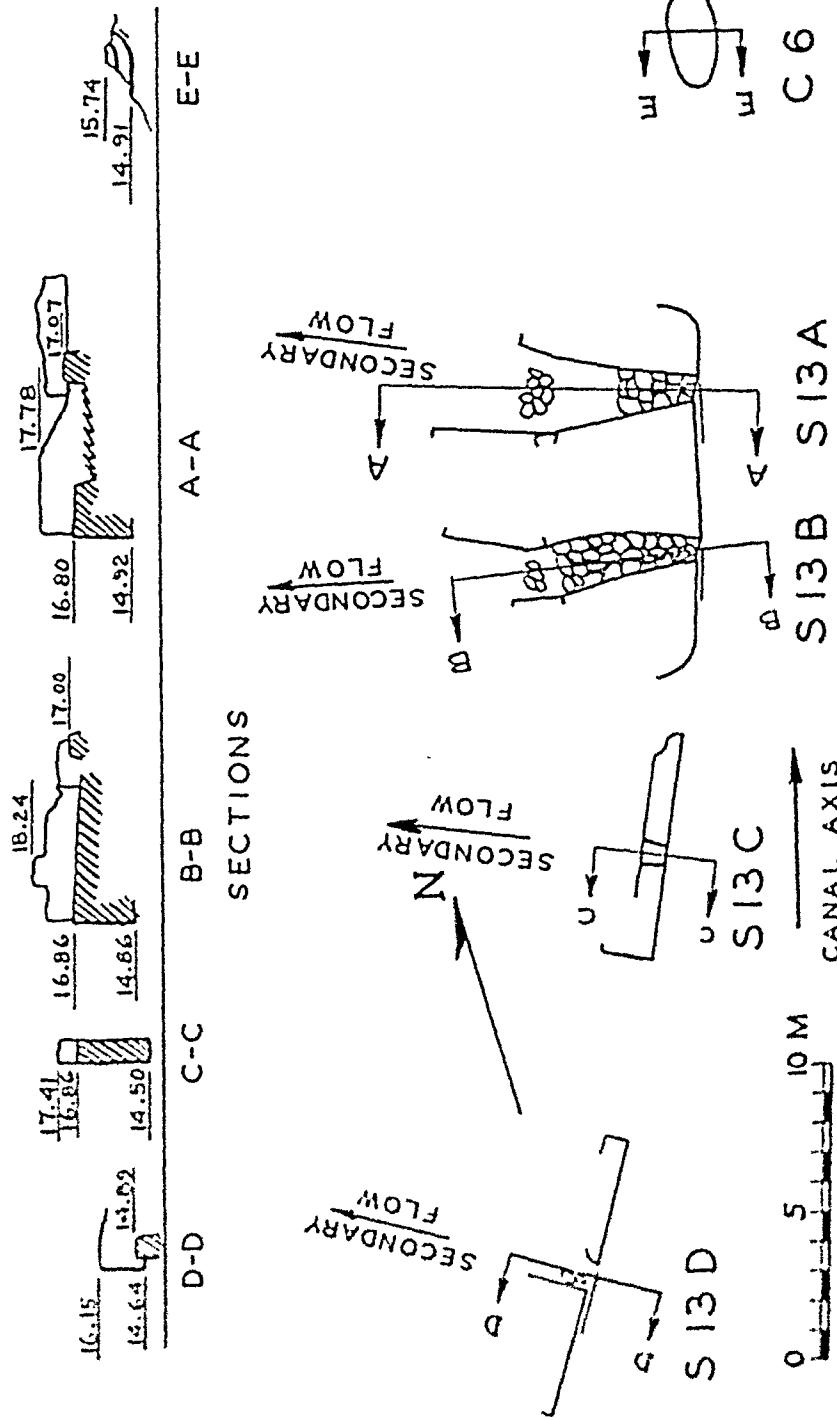
PLANS AND ELEVATIONS OF FOUR WORKS

RLB

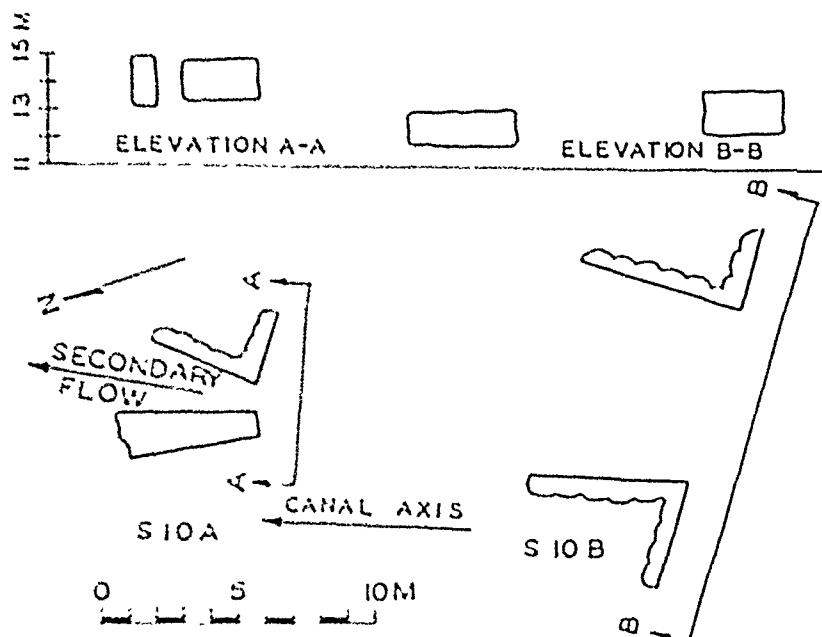
40. Plans and elevations of four irrigation works. W1, W2, and W4 are drops used to bring the level of the water in the secondary system to a lower level. W10 is probably the remains of a right-angle sluice in the primary system.

PLAN AND SECTIONS OF QUADRUPLE SLUICE S13

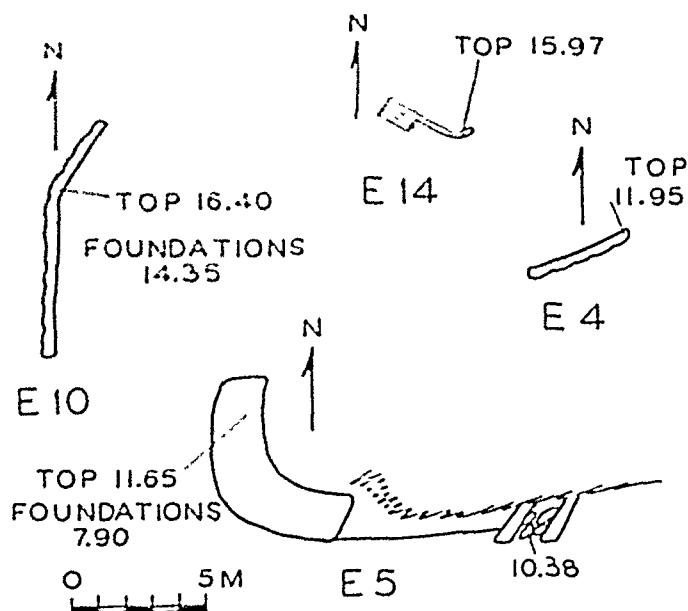
RLB



(1) Plan and sections of quadruple sluice S13 showing the four sluices in plan relation to each other. S13A, S13B, and S13C show considerable reconstruction. C. refers to C. reference to the west wall of the canal.



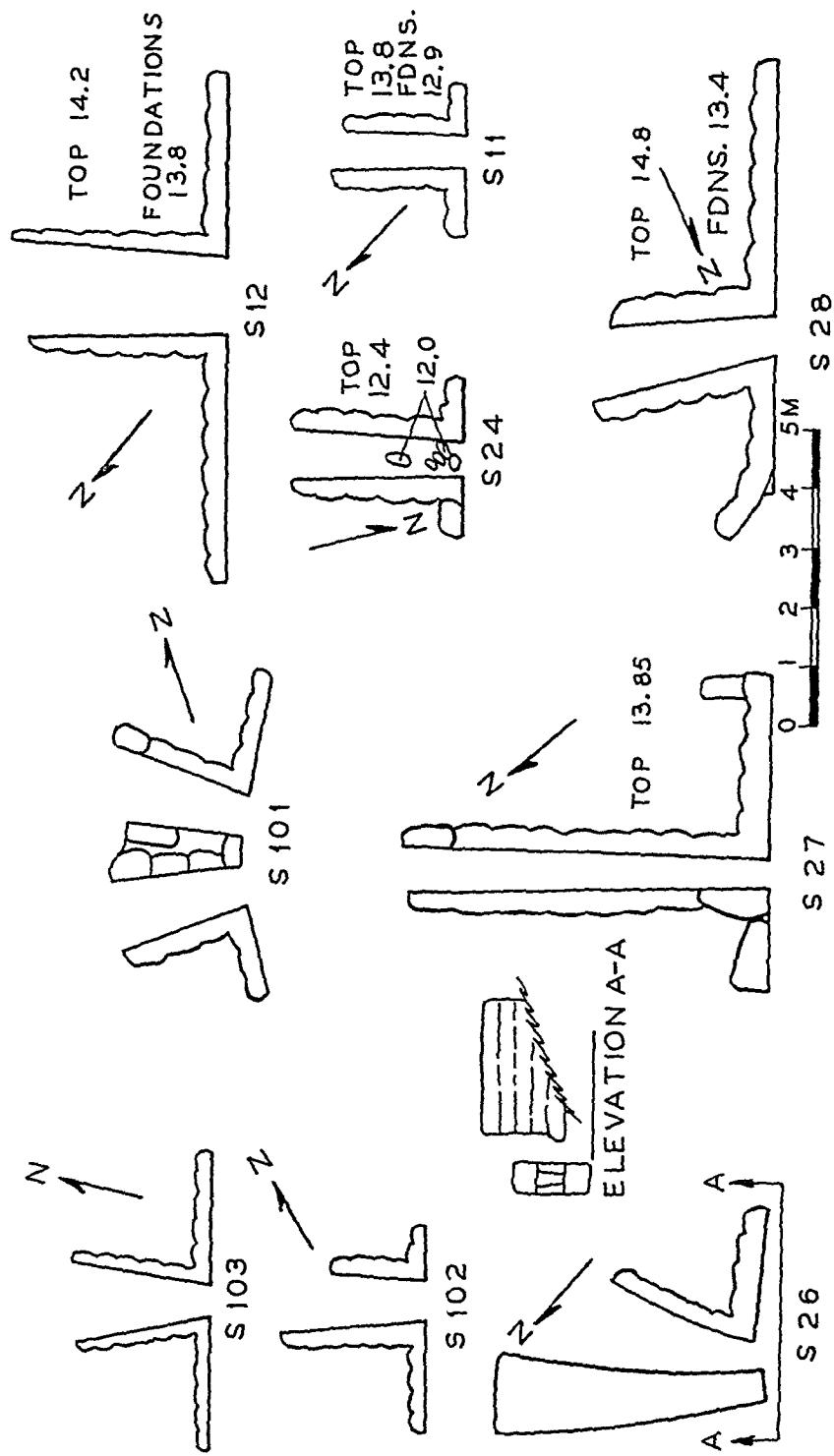
PLAN AND ELEVATIONS OF S10



PLANS OF FOUR EMBANKMENTS

RLB

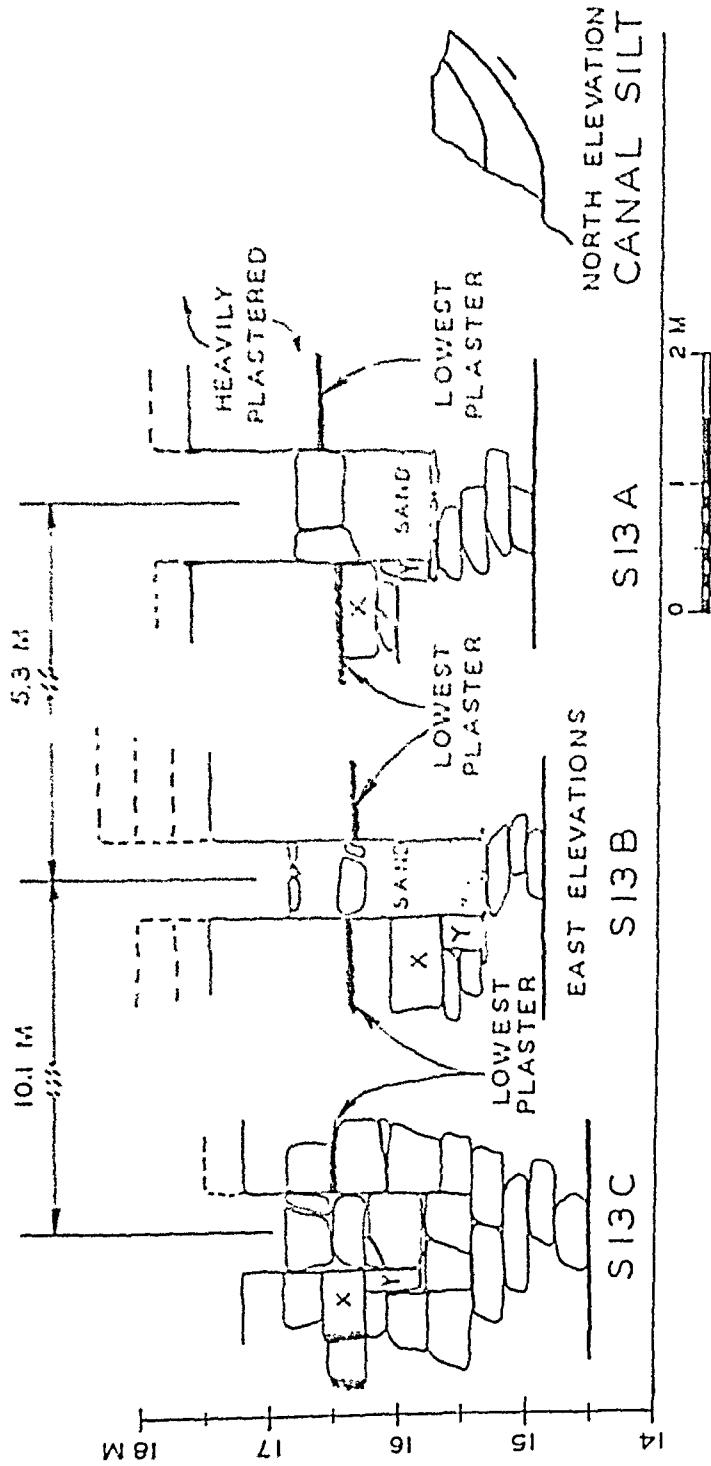
42. Top shows plan and elevations of sluice S10. S10A is an angle sluice from the Middle Phases of the primary canal. S10B appears to be a right-angle structure of uncertain use. Bottom shows plans of four separate embankments all from the primary system. E5 is from the Earlier Phases.



PLANS OF NINE SECONDARY SLUICES

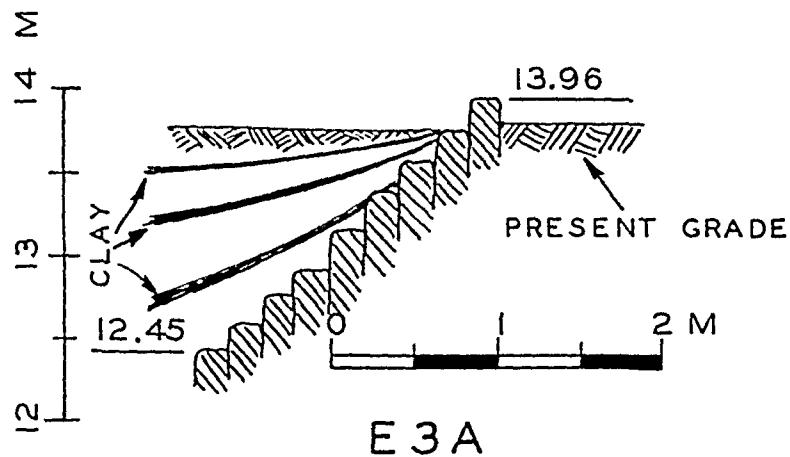
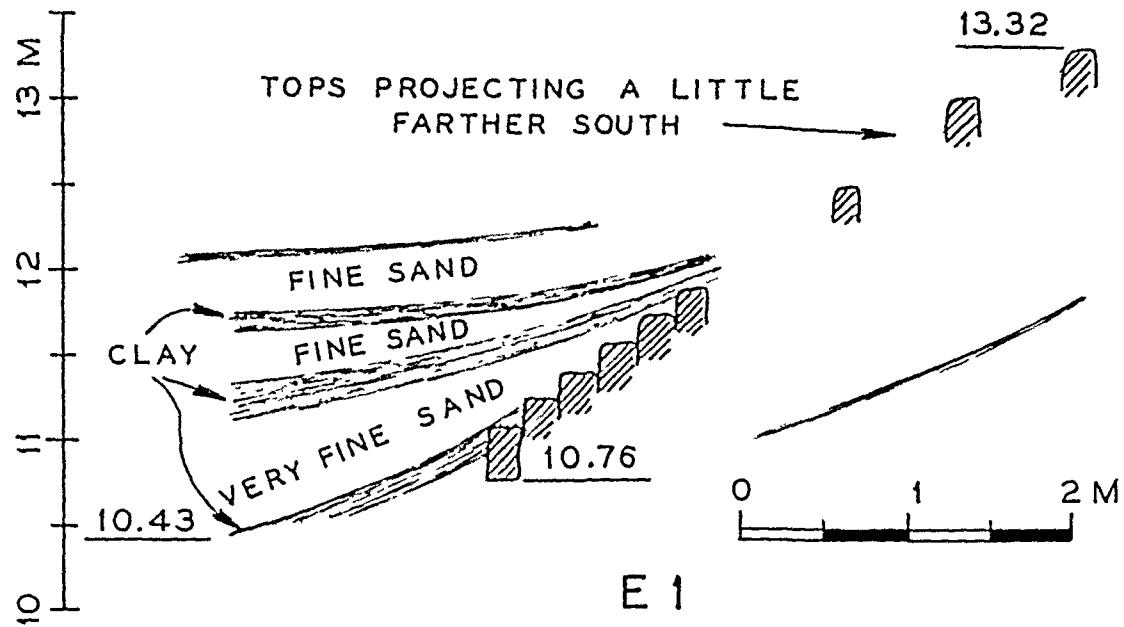
RLB

43. Plans of nine secondary sluices. All are right-angle sluices except S26, which is an angle sluice. None are paved except S24, indicating that the water did not change elevation in going through the sluices.



ELEVATIONS OF SLUICE S13

44. East elevations of sluice S13 and north elevation of adjoining section of canal silt C6. Note that the lowest level of plaster shows that the sluices had been used for some time before the plaster was added to the surface. Numerous phases of reconstruction are evident in the east elevations.



NORTH ELEVATIONS OF E1 & E3A

RLB

45. North elevations of embankments E1 and E3A. The three higher stones of E1 were projecting farther south of the excavated section. Embankments of this type were placed at bends or other places where erosion would tend to remove the earthen wall of the primary canal.



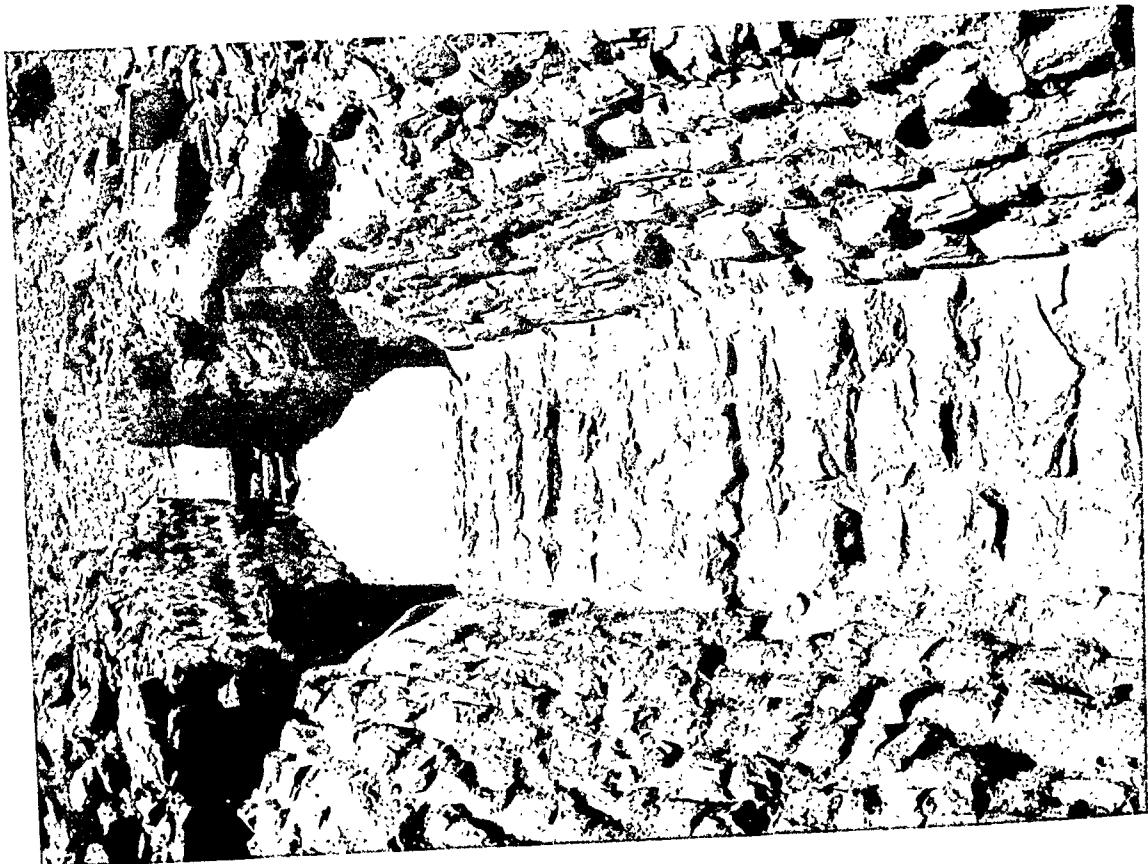
46. Part of embankment or sluice exit showing the proportion of the blocks used, deeper than wide. The intervals on the stick are $\frac{1}{2}$ m. Found on the west side of Wadi Mablaqah.



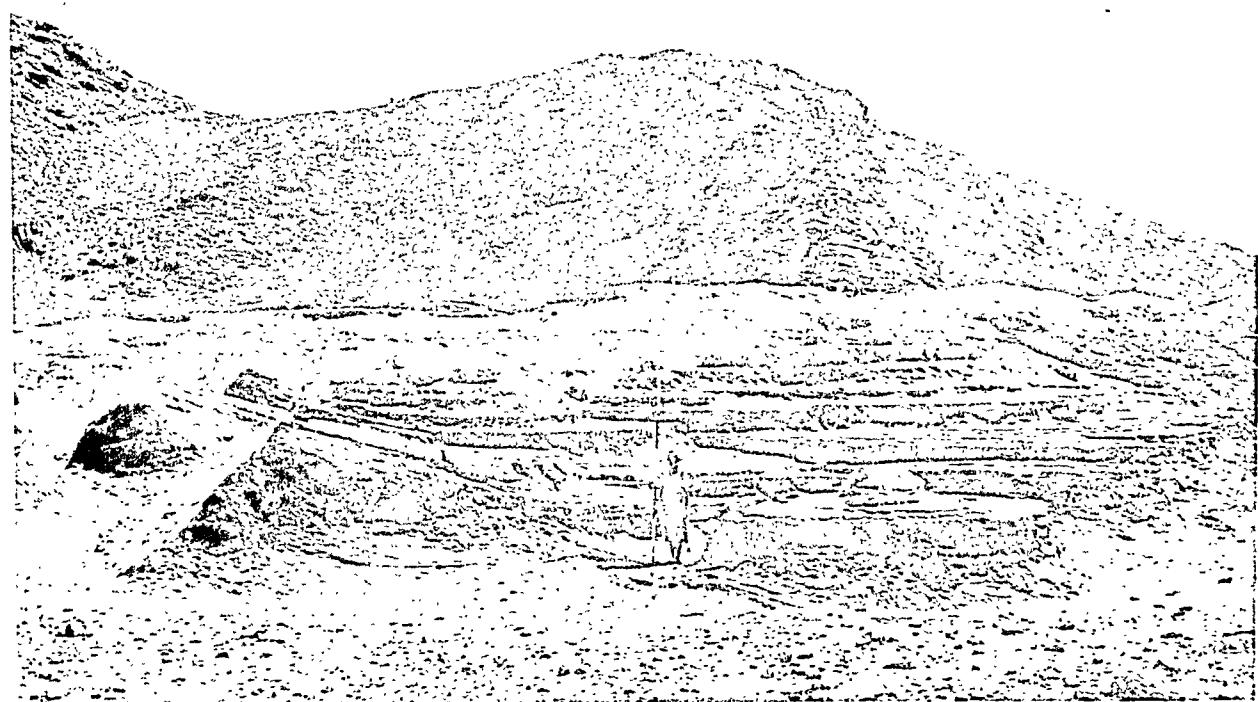
47. Excavation in progress at quadruple sluice S13. Note the level canal bottom in the foreground and higher sections (shown as C6 in the drawings) towards the ruins.



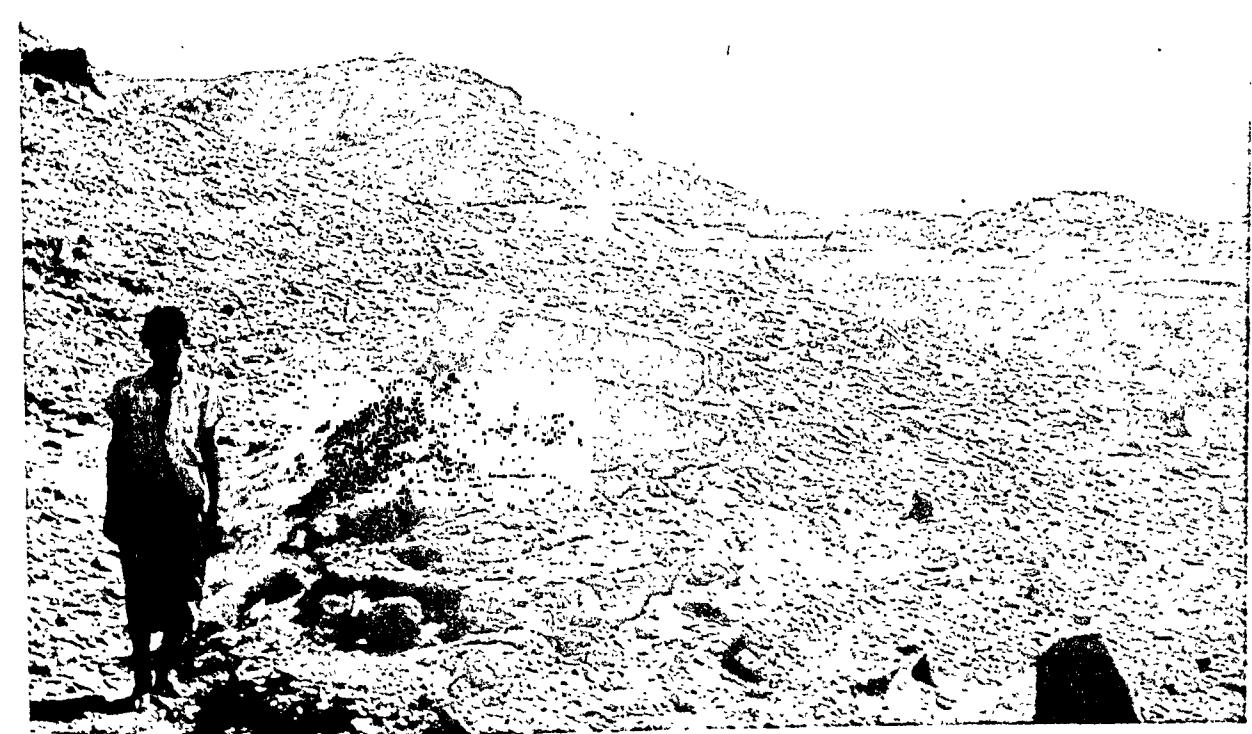
49. Lower corner of south embankment wall of exit of sluice S1. The paving shown looks like flat slabs, but actually the depth of the blocks is greater than the width.



48. Exit of sluice S1 showing the embankments at each side with blocks arranged in steplike rows. Walls of the main works above the exit are plastered.



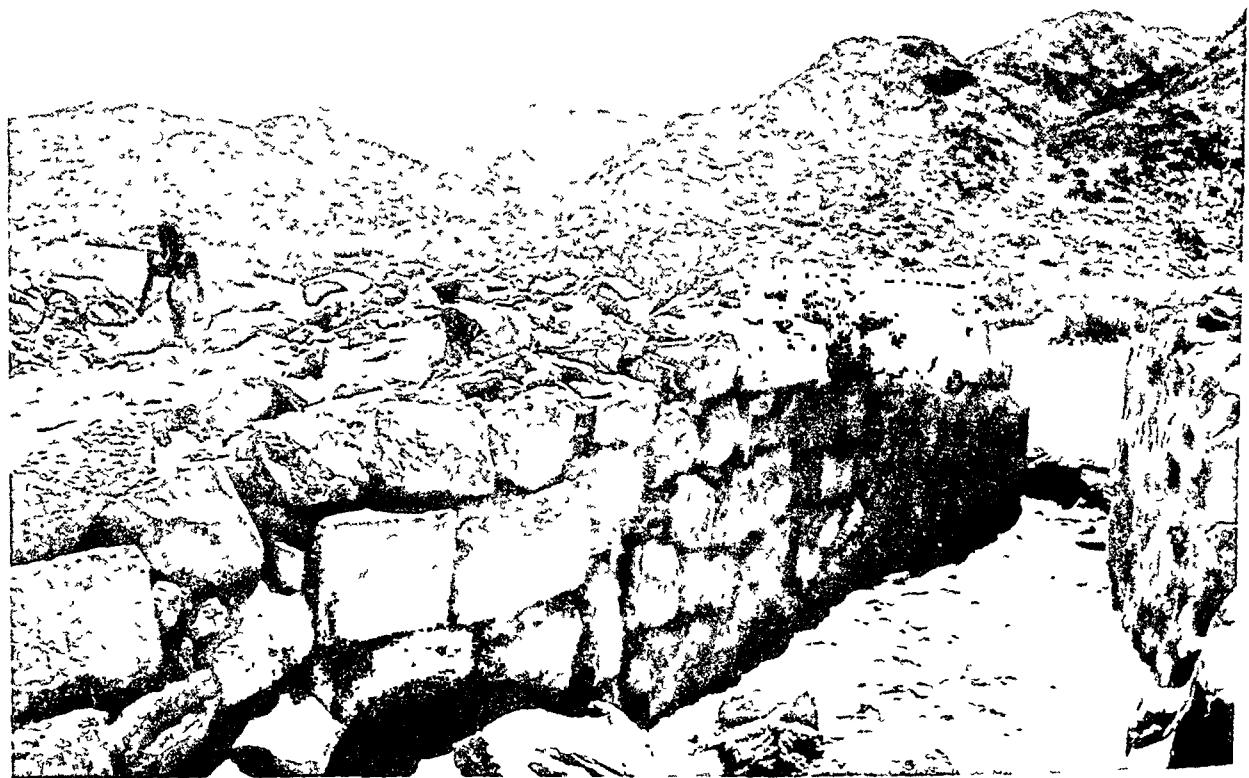
50. Section of canal to the east of sluice S1. Note the level strata of canal bottoms and the canal side sloping up to the left. Unstratified field silt is in the background.



51. Segment of canal side (C3) near the mountain edge to the north of sluice S1 which can be seen in the right background. Photograph taken a little farther north than one above.



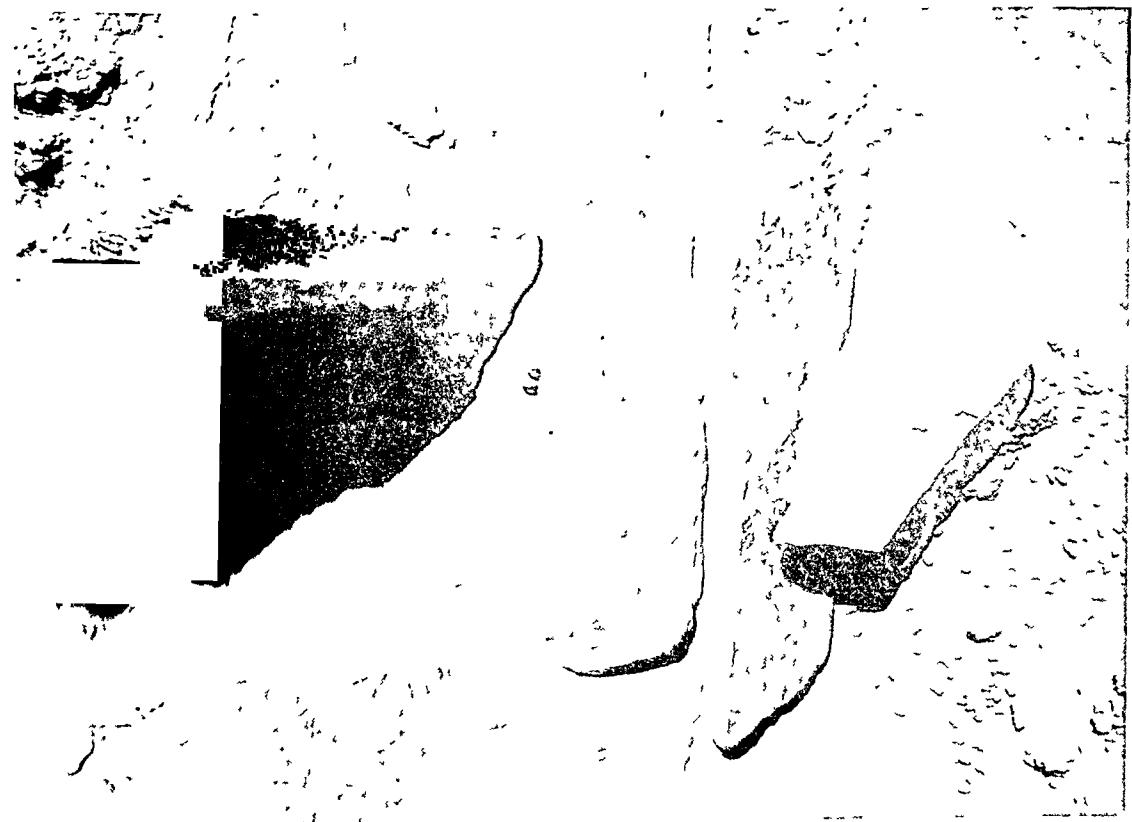
52. Silt plateau formed between two mountain spurs just east of sluice S1, which can be seen in the center of the photograph. Note the "rectangular erosion" which covers this silt plateau.



53. Exit of sluice S13A showing the poor reconstruction at the left. Note that this is unplastered, while the original works to the right are heavily plastered.



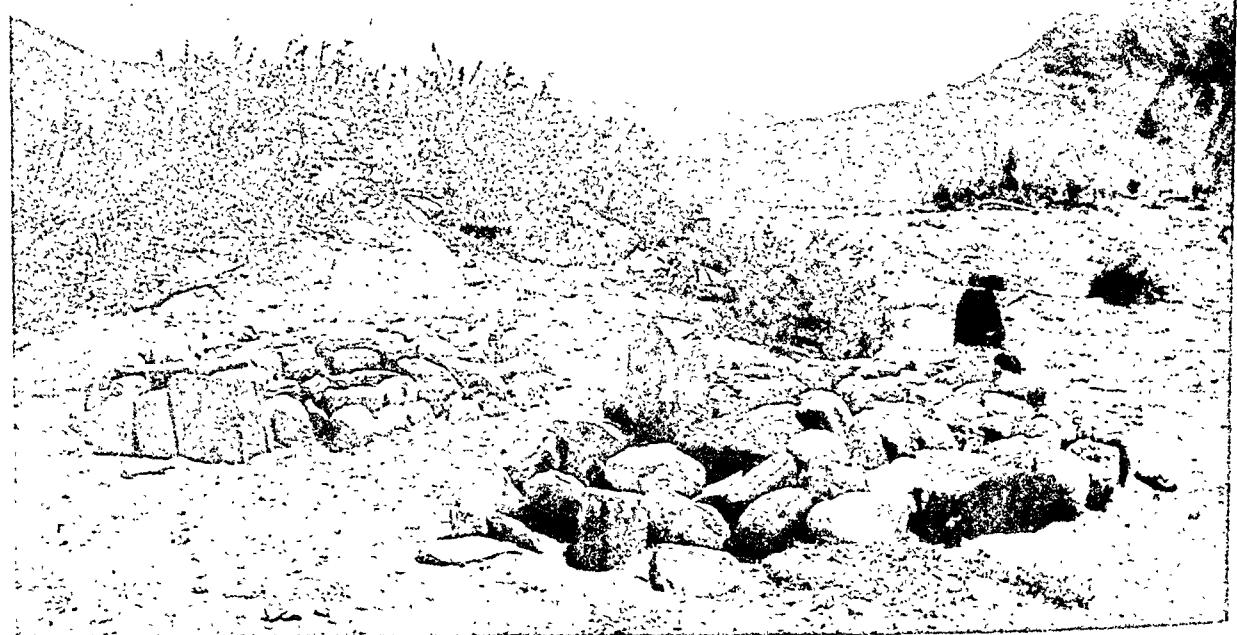
55. Modern Arab *husn* made with smooth-faced Qatabanian blocks from ancient houses and irrigation works. These blocks have wedge-shaped backs which cause the walls to buckle out as the right one is doing.



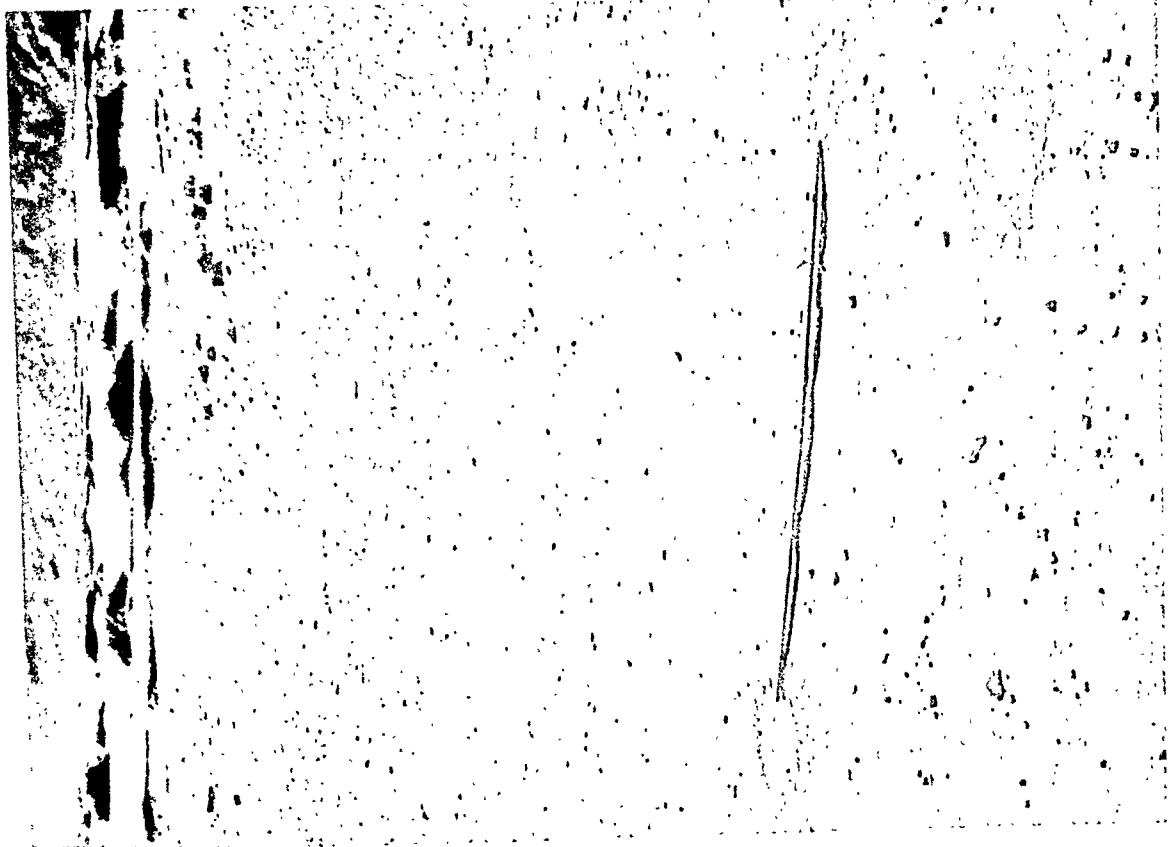
54. Entrance to sluice S13B showing "gates" used to decrease the water flow through the sluice. Such restrictions were left in place permanently. Adjustable sluice gates were never used.



56. Angle sluice S10A with Arab standing at entrance to sluiceway. The canal ran parallel to the front wall. The elevation and the large size of the blocks of this work place it in the Middle Phases of canal construction.



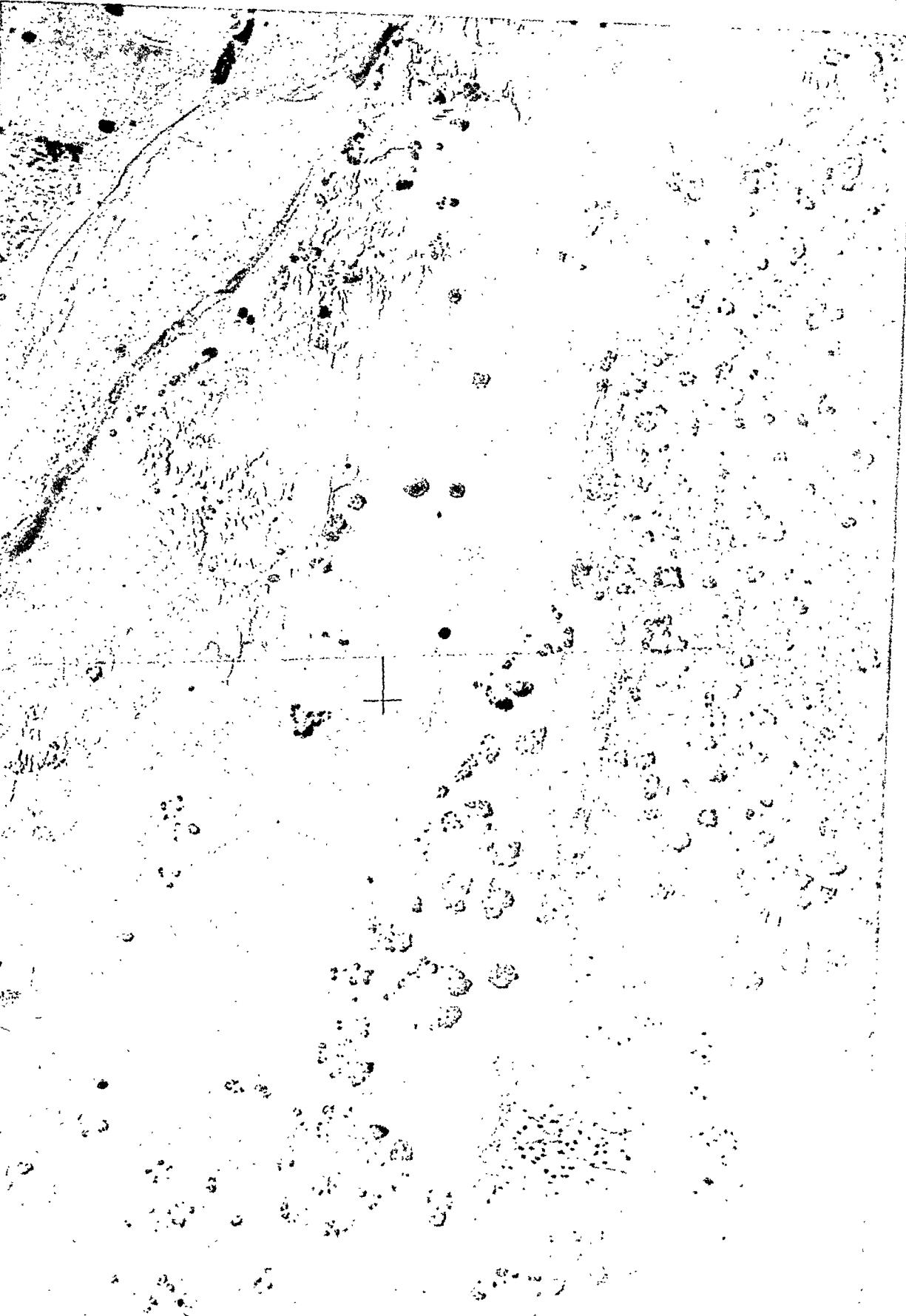
57. Two modern graves showing the covering of stones set in steplike arrangement similar to that used in ancient stone embankments.



59. Small mud circles on ancient field area east of el-Hemu arranged in rows. The rod in the foreground is 3 m. long. Surface of circles is level with surrounding ground.

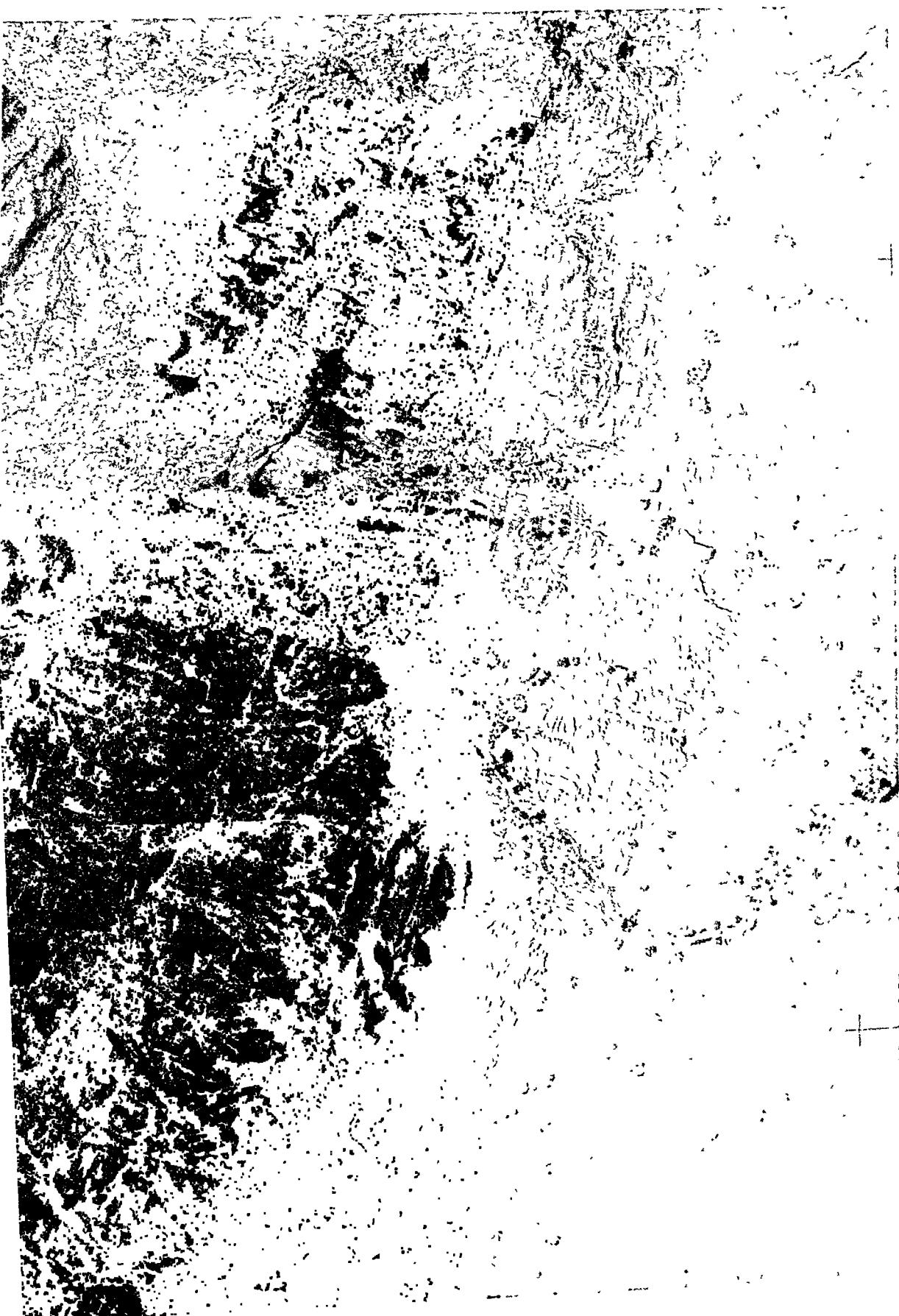


58. Ancient field area showing severe "rectangular erosion," which apparently started in very shallow ditches on the fields. The Arab is standing in the center of one of these.

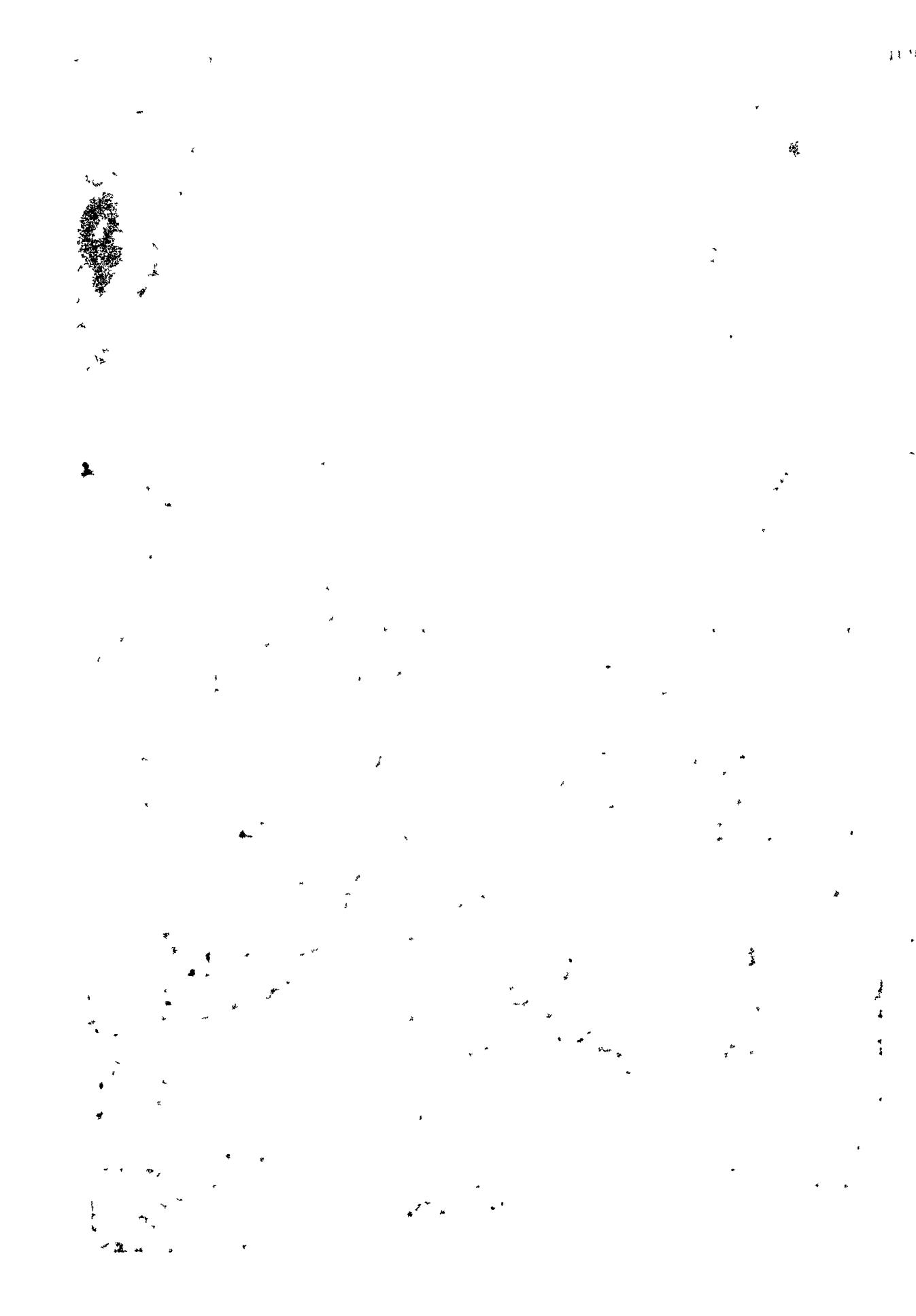


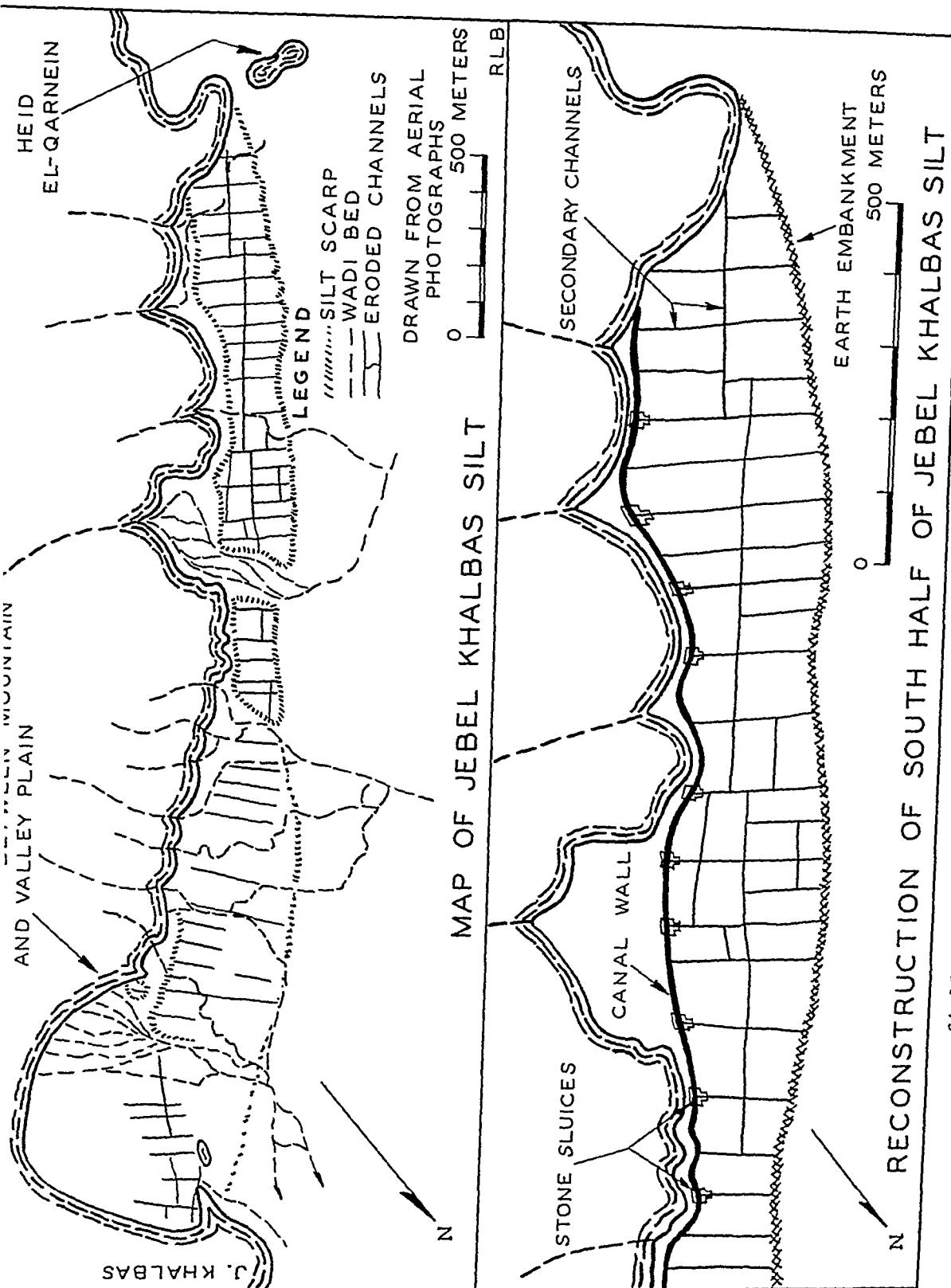
60. Aerial photograph of part of the Mablaqah silt. North is to the left. The bed of the Wadi Beihān runs along the top, and that of Wadi Mablaqah along the bottom. Note the "rectangular erosion" at several places along the Wadi Beihān. (RAF photograph.)





62. Aerial photograph of the Jebel Khalbas silt. North is to the left. Rectangular erosion covers the whole surface of this silt, which extends in a narrow band along the mountain edge. A lower level of silt runs beyond this. (RAF photograph.)





64. Map of Jebel Khalbas silt. The top is drawn from aerial photographs and the bottom is a reconstruction of the southern half. The runoff from the mountains collected behind an earthen wall about 10 m. from the mountain edge. The water was distributed from this canal by stone sluices placed at intervals in the earthen wall.

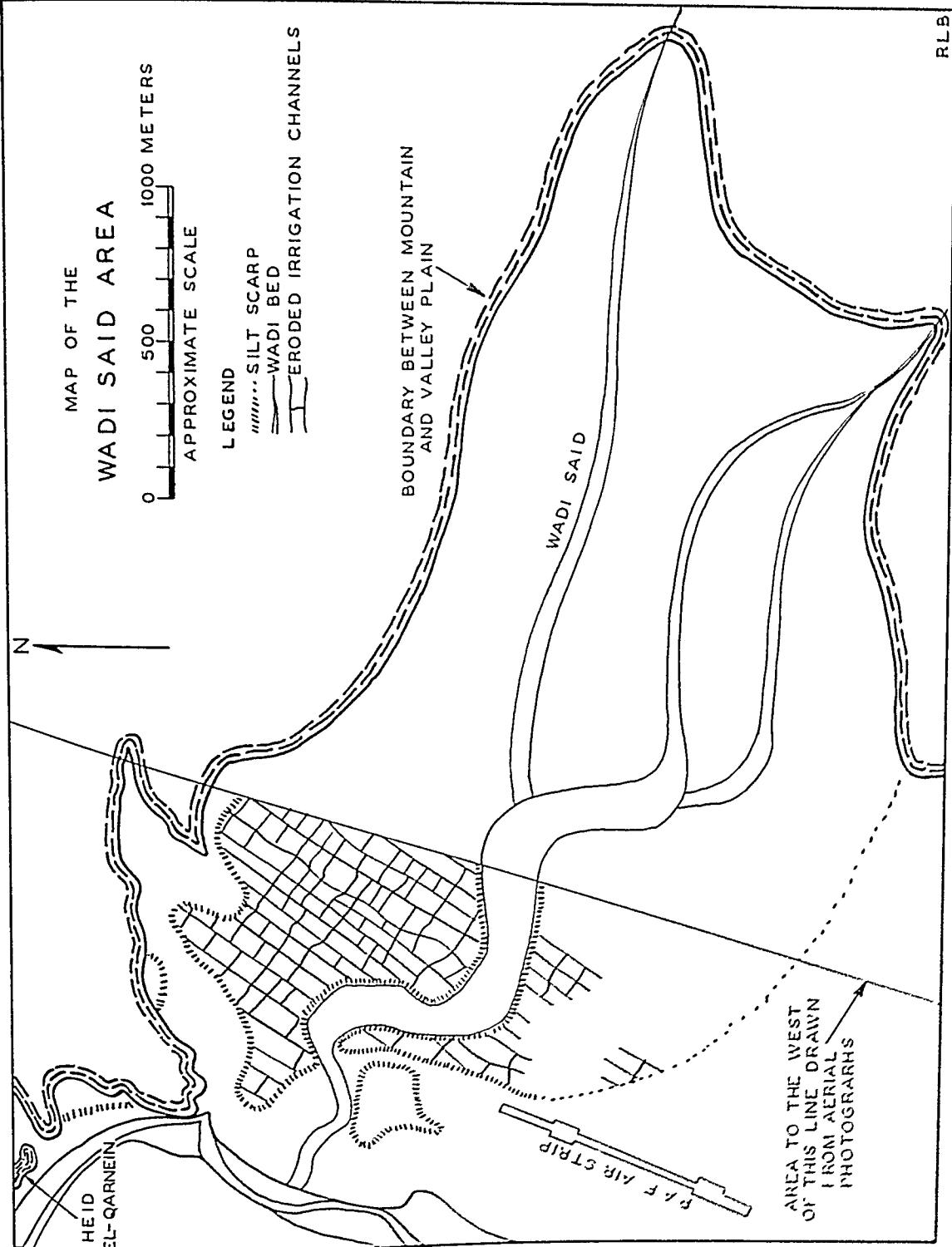
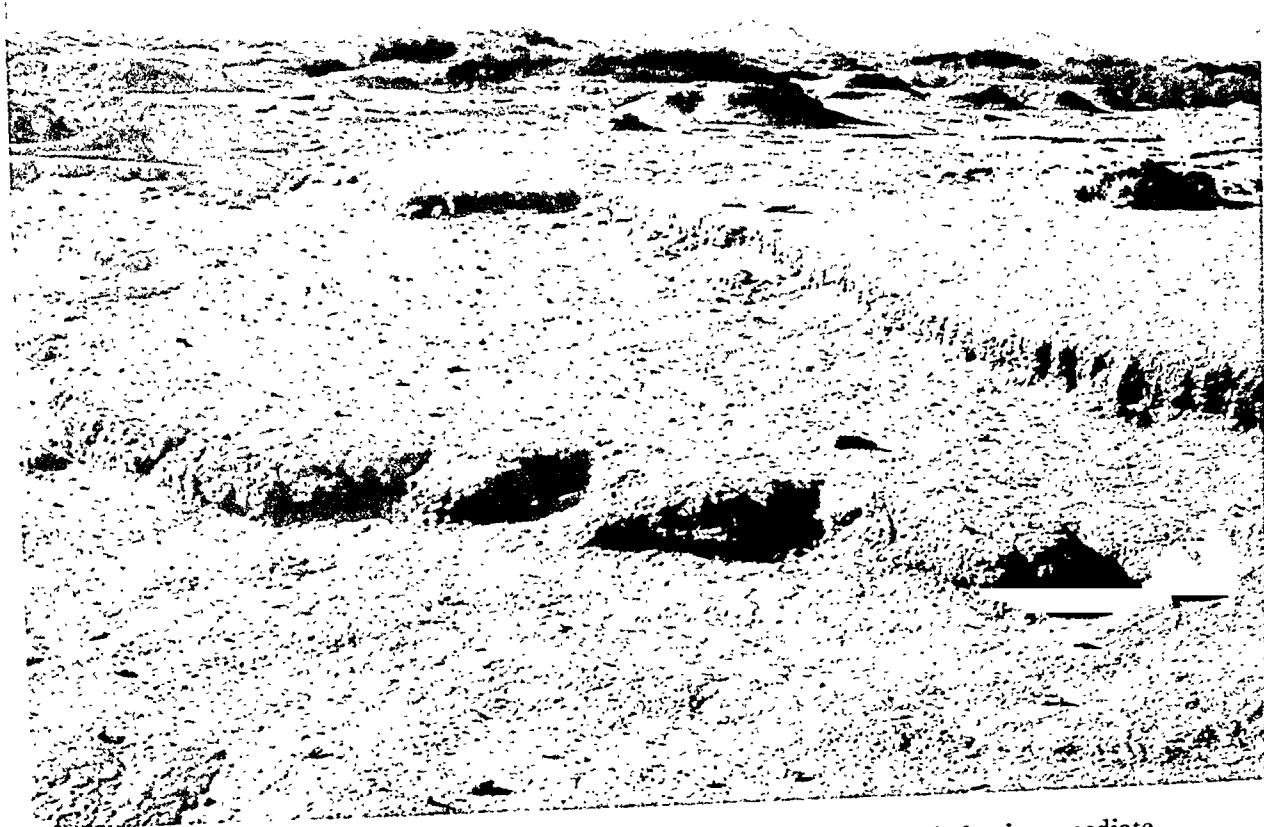
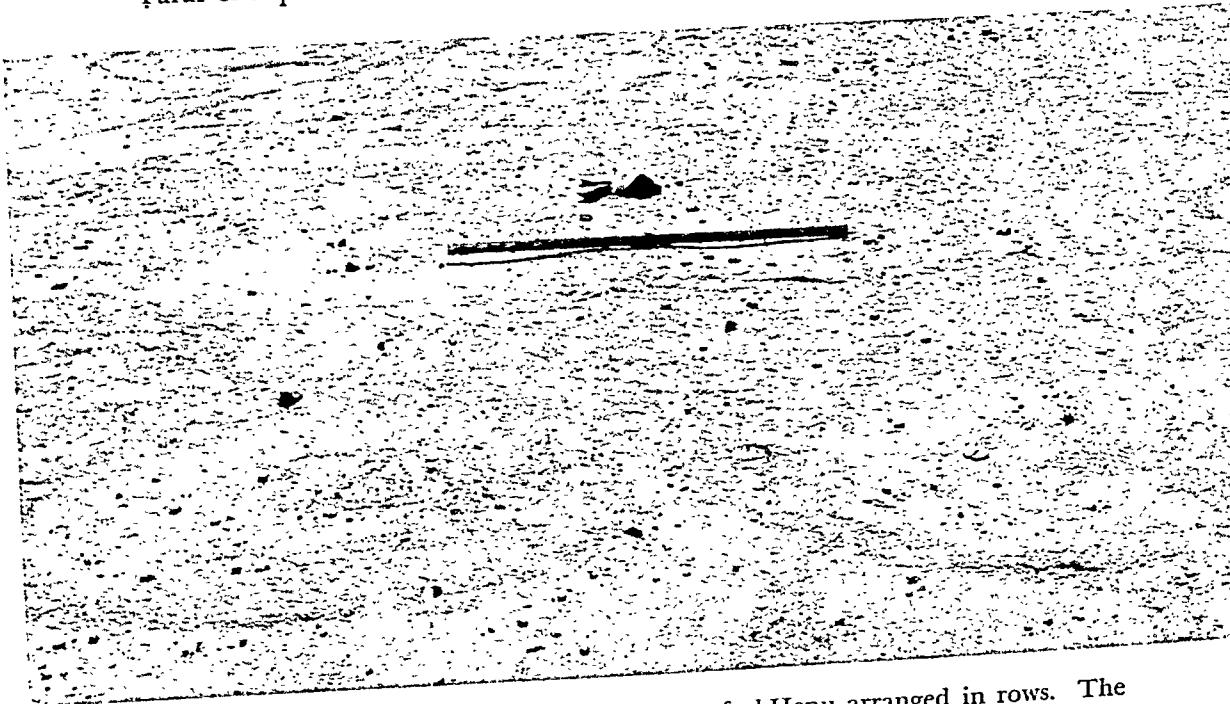


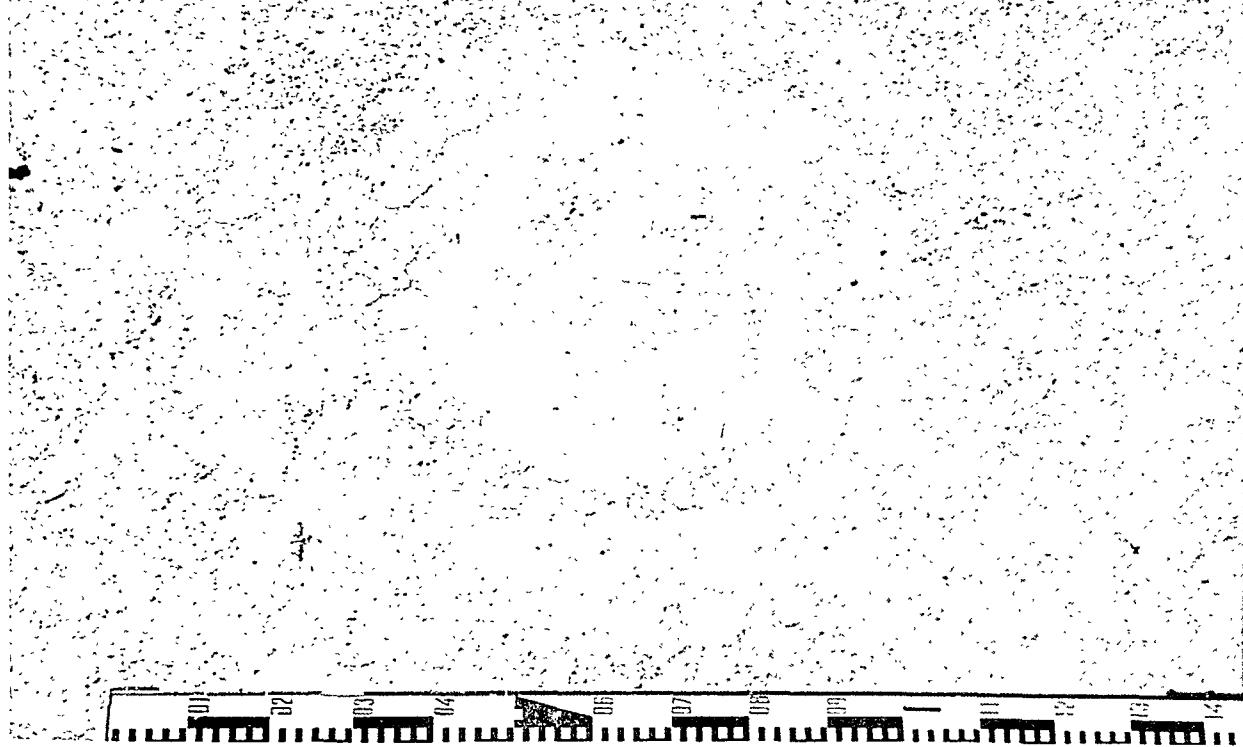
Fig. Map of the Wadi Sa'id area showing the remains of the ancient Sa'id silt. The whole surface of the silt appears to be uniformly covered with rectangular erosion, and the Wadi Sa'id has eroded a wide bed through the central part of the silt.



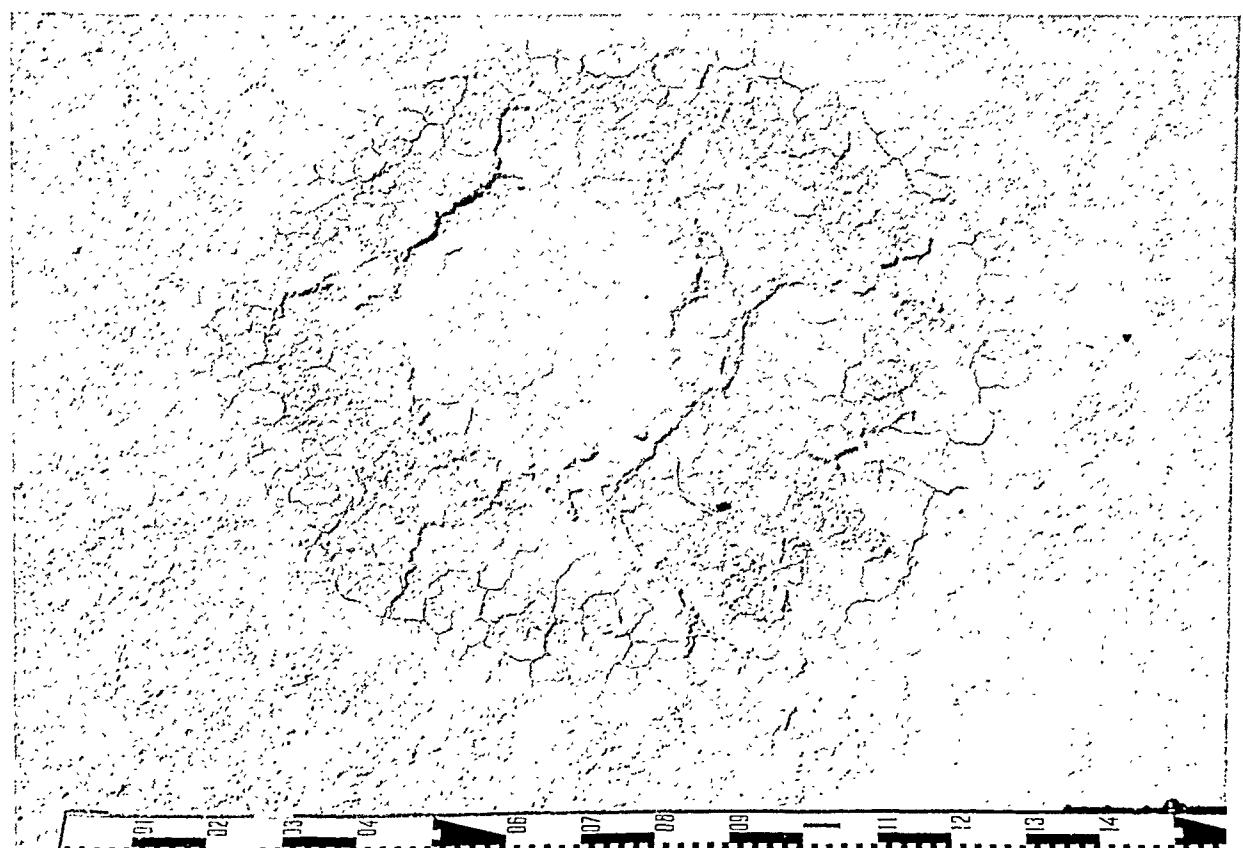
66. Different levels of ancient field silt. Note that one of the intermediate levels shows clear evidence of furrows. This section of silt is near the spur of Taraf el-Aqeir.



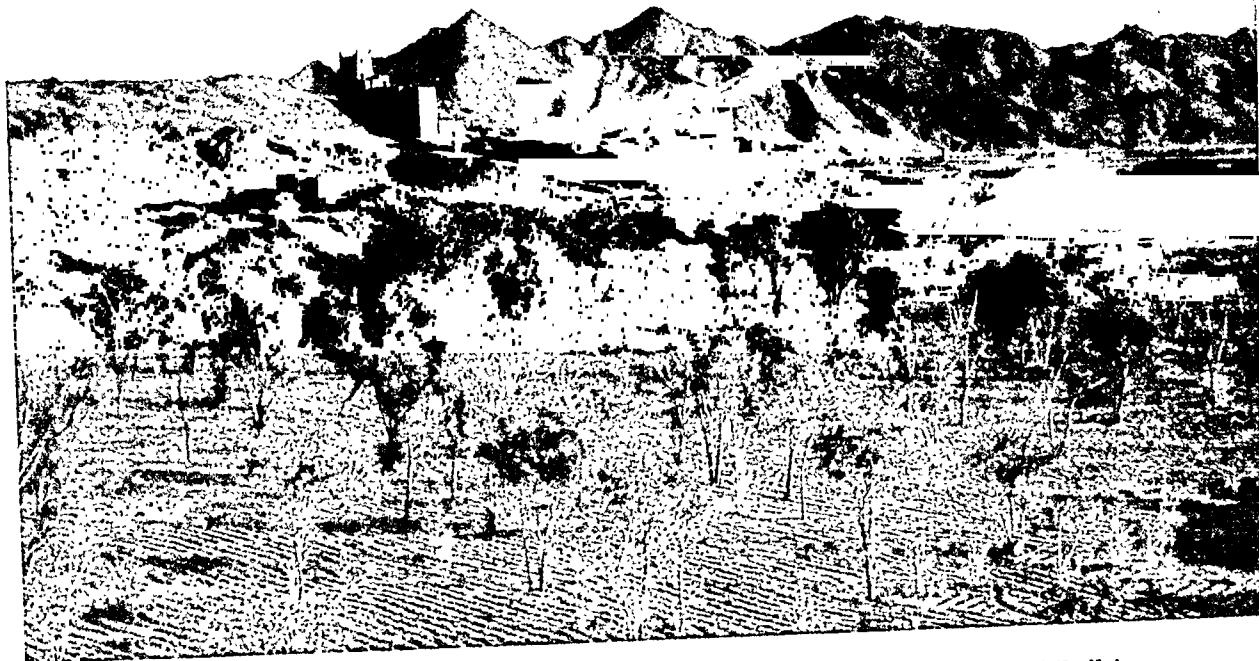
67. Mud circles on ancient field area east of el-Henu arranged in rows. The rod in the center is 3 m. long. Note that concentric rings almost touch each other.



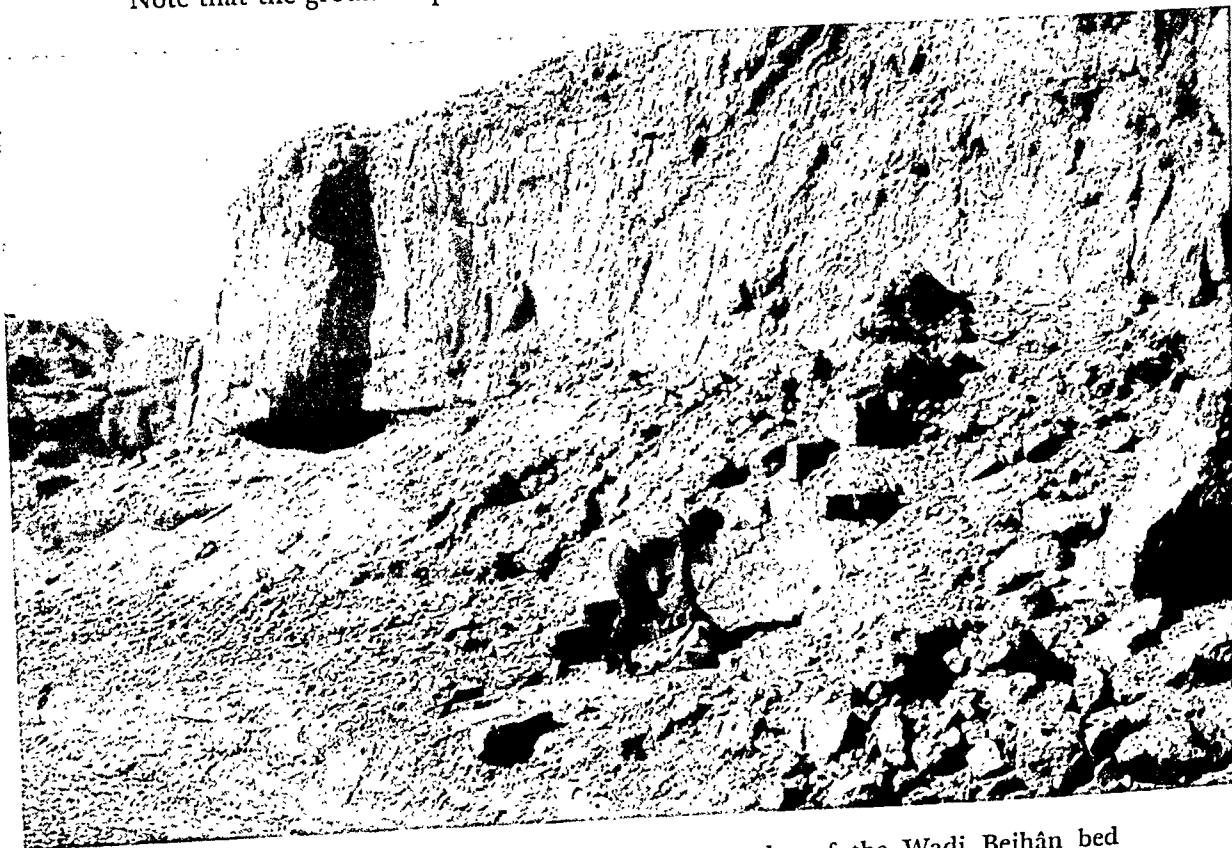
68. Close-up of mud circle 50 to 60 cm. in diameter. The narrow outer concentric band, about 10 cm. wide, is covered with mud cracks.



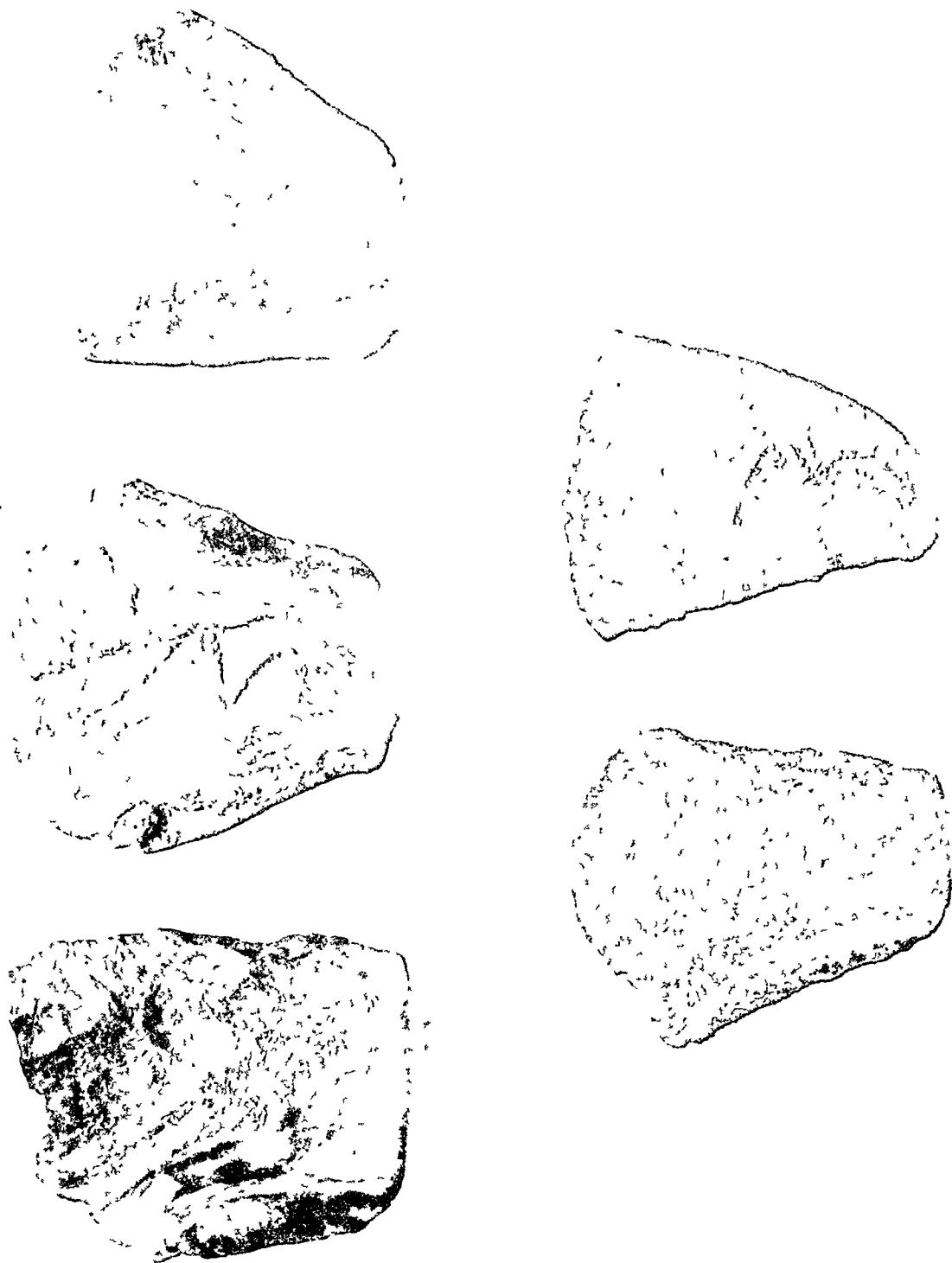
69. Close-up of mud circle 90 to 100 cm. in diameter. Note the wide, dark, outer concentric band about 30 cm. wide covered with mud cracks. The significance of the mud cracks is not apparent.



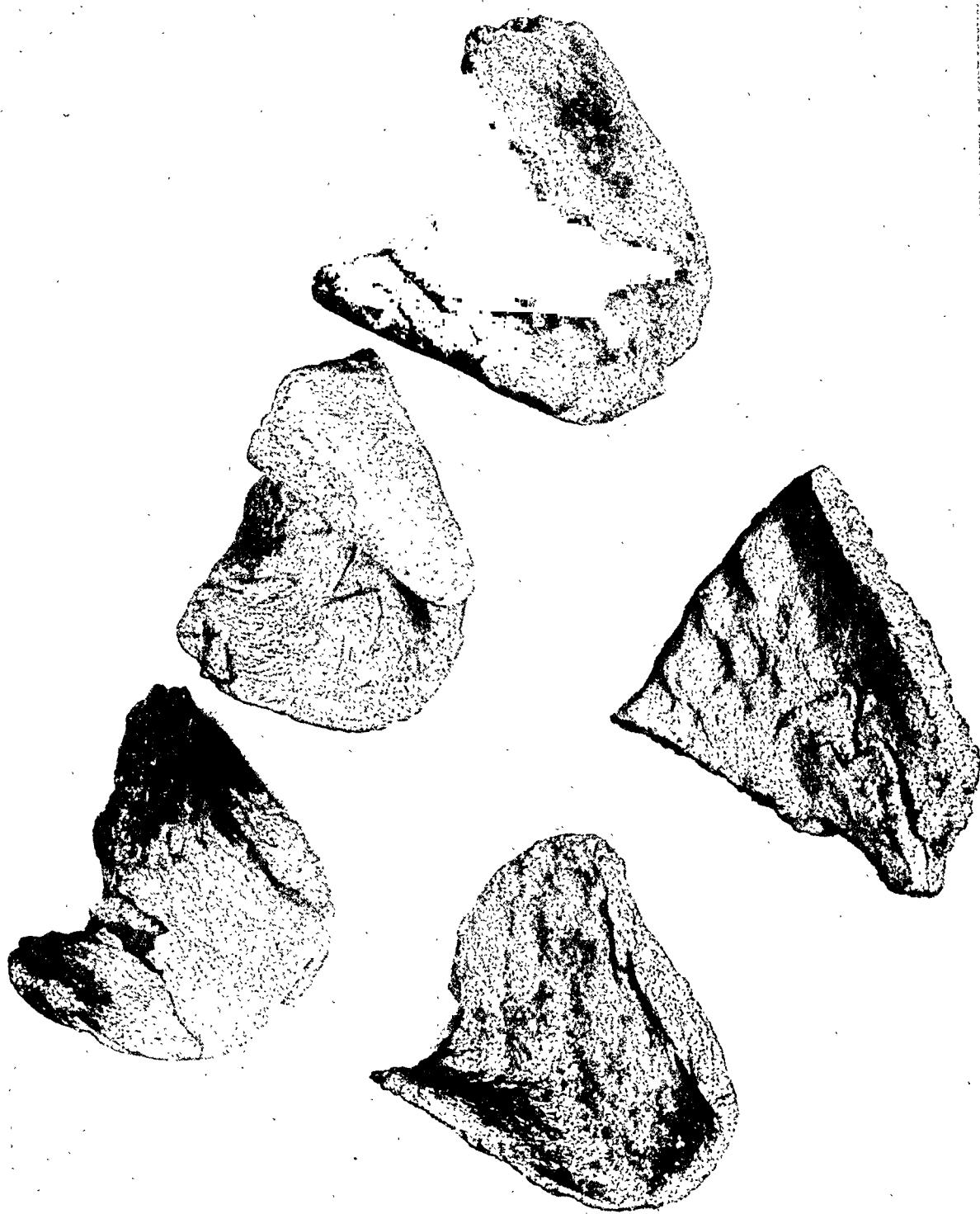
70. 'Elb grove north of Hajar Kohlān on the western edge of the Wadi Beiħān.
Note that the ground is plowed with narrow furrows under the trees.



71. Remains of an ancient well at the very edge of the Wadi Beiħān bed
near Hajar bin Ḥumeid. The meandering bed of the wadi has cut into the
ancient field silt in the background, exposing the well.



72. Qatabanian irrigation spouts as viewed from the top. The maximum dimension of the spouts is less than 15 cm. Note the South Arabic letter scratched on two prior to firing.

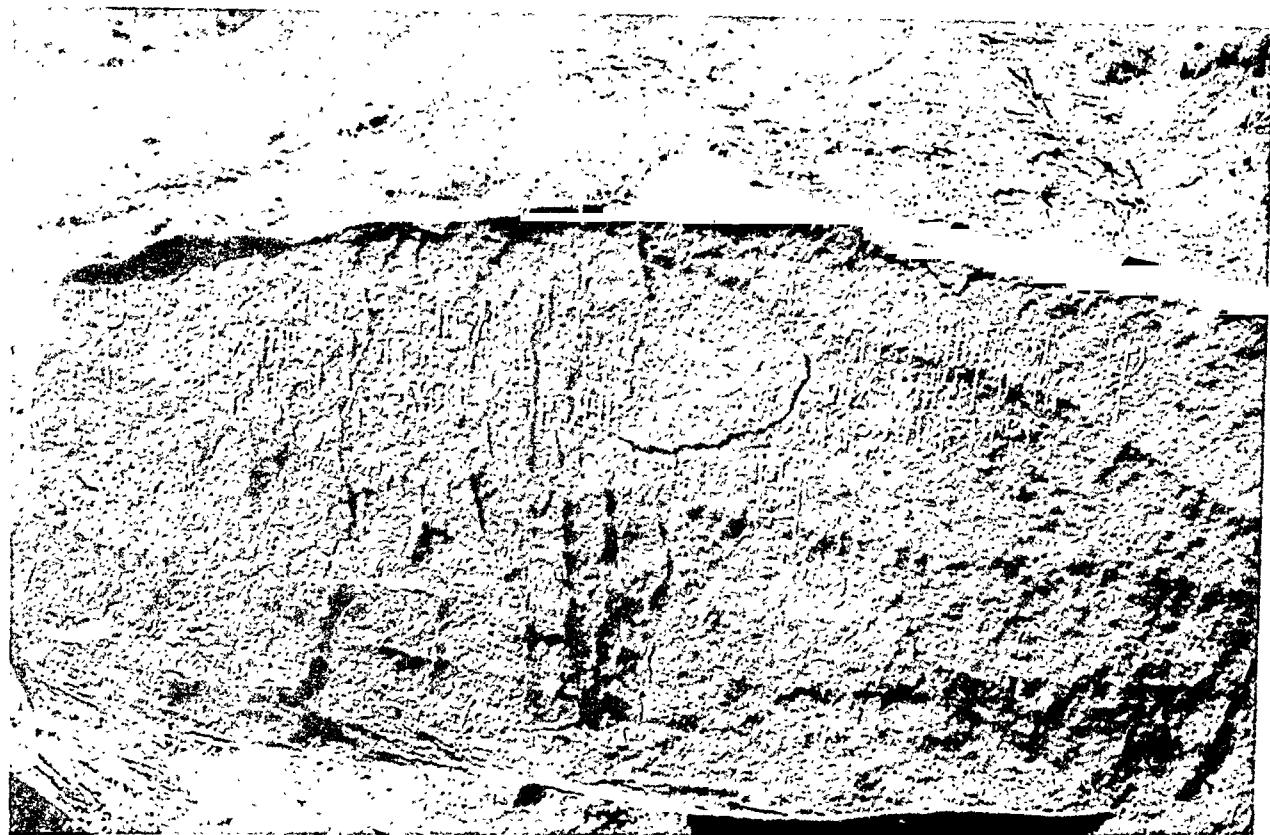


73. Qatabanian irrigation spouts used to let water from tertiary channels into the individual fields. This is the first time that such a pottery utensil has been reported from any ancient civilization. Note finger marks at back of front spout.

CROSS SECTION OF WADI SELLAH

DATUM SURFACE
SAND &
M. B.E.H.M. ETC

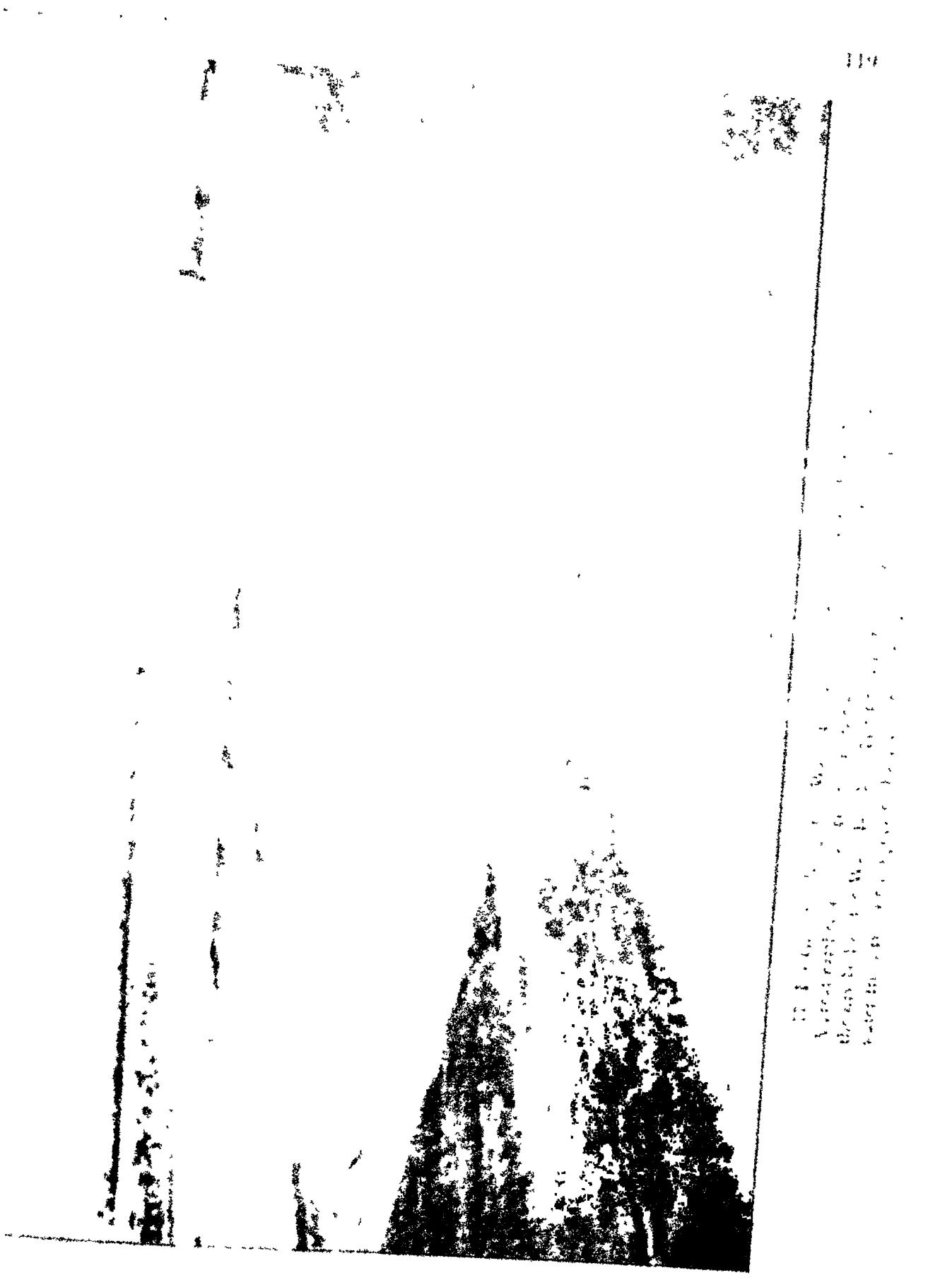


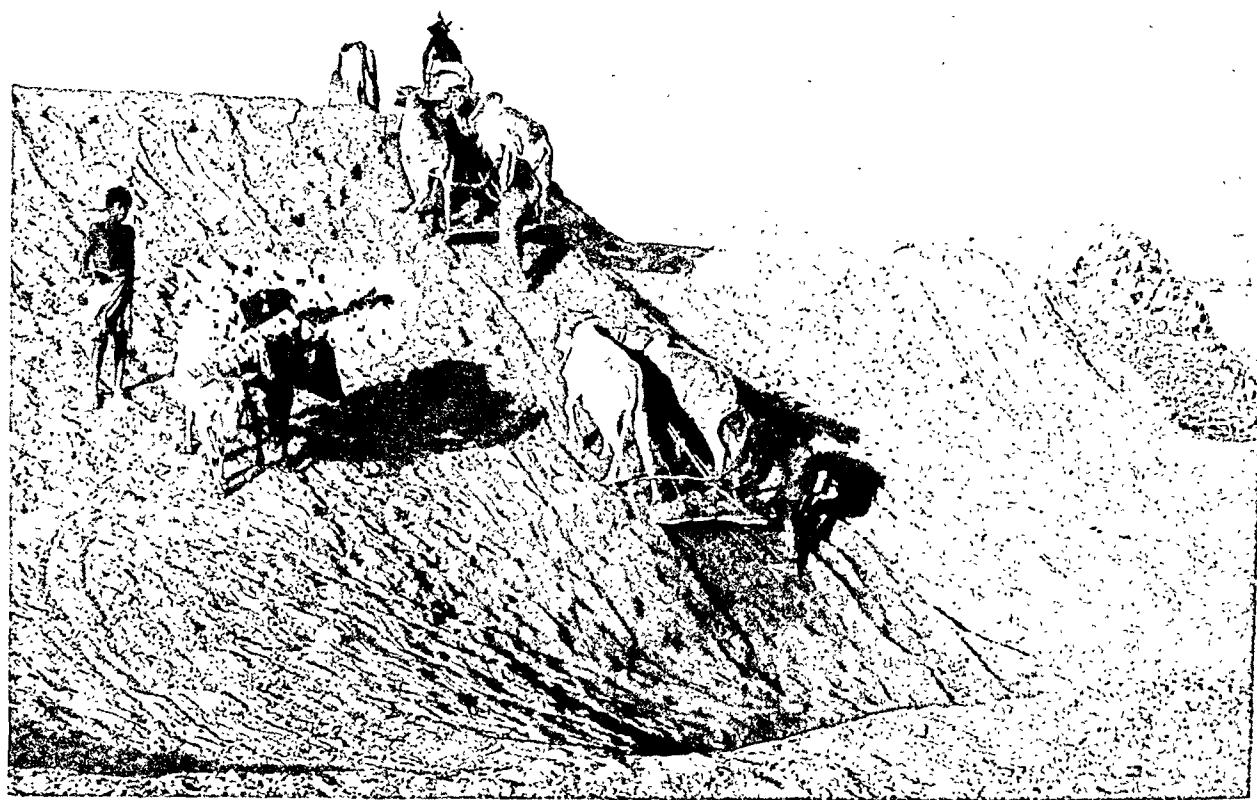


75. Large inscribed stone found near She'b edh-Dhaqab. This is probably part of a sluice or overflow and can be dated in the fourth century b.c. The only dam found in Beihān was associated with this inscription.

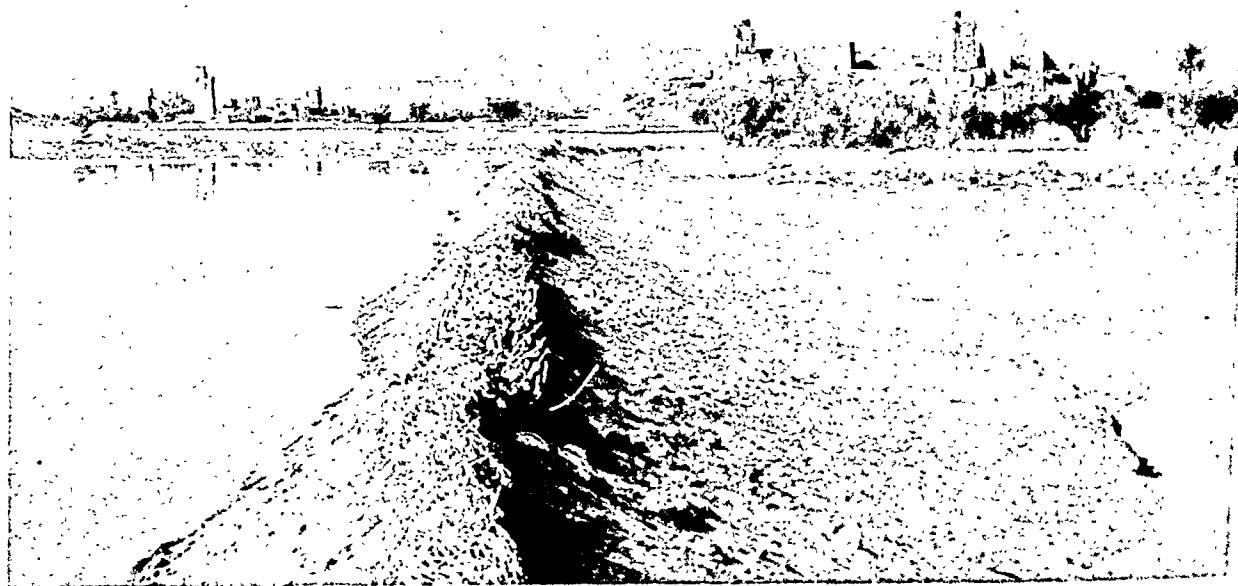


76. Small inscribed block found with above inscription with a single word, *rahbat*, which apparently refers to a type of irrigation works. This same word also appears in the longer inscription.

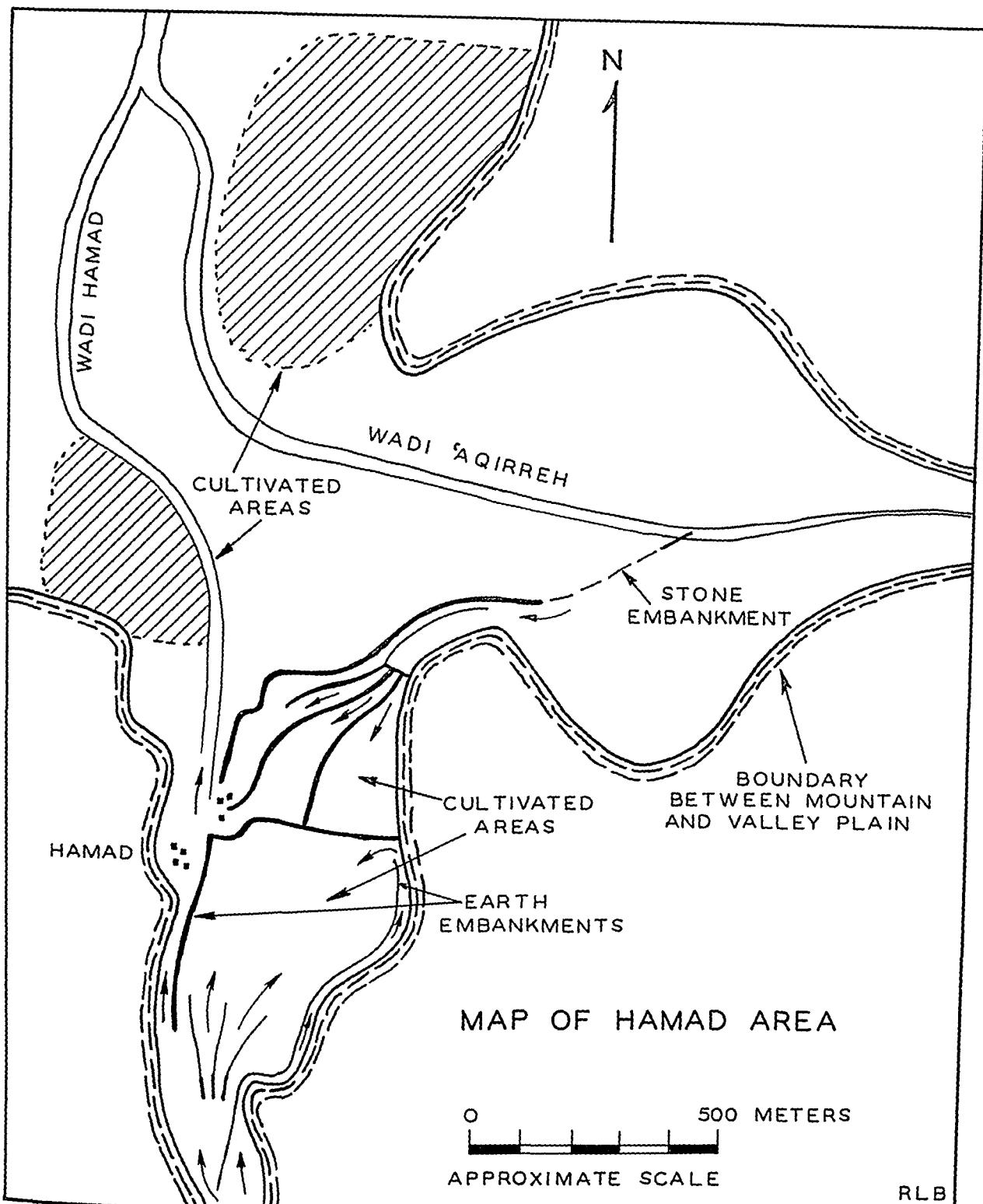




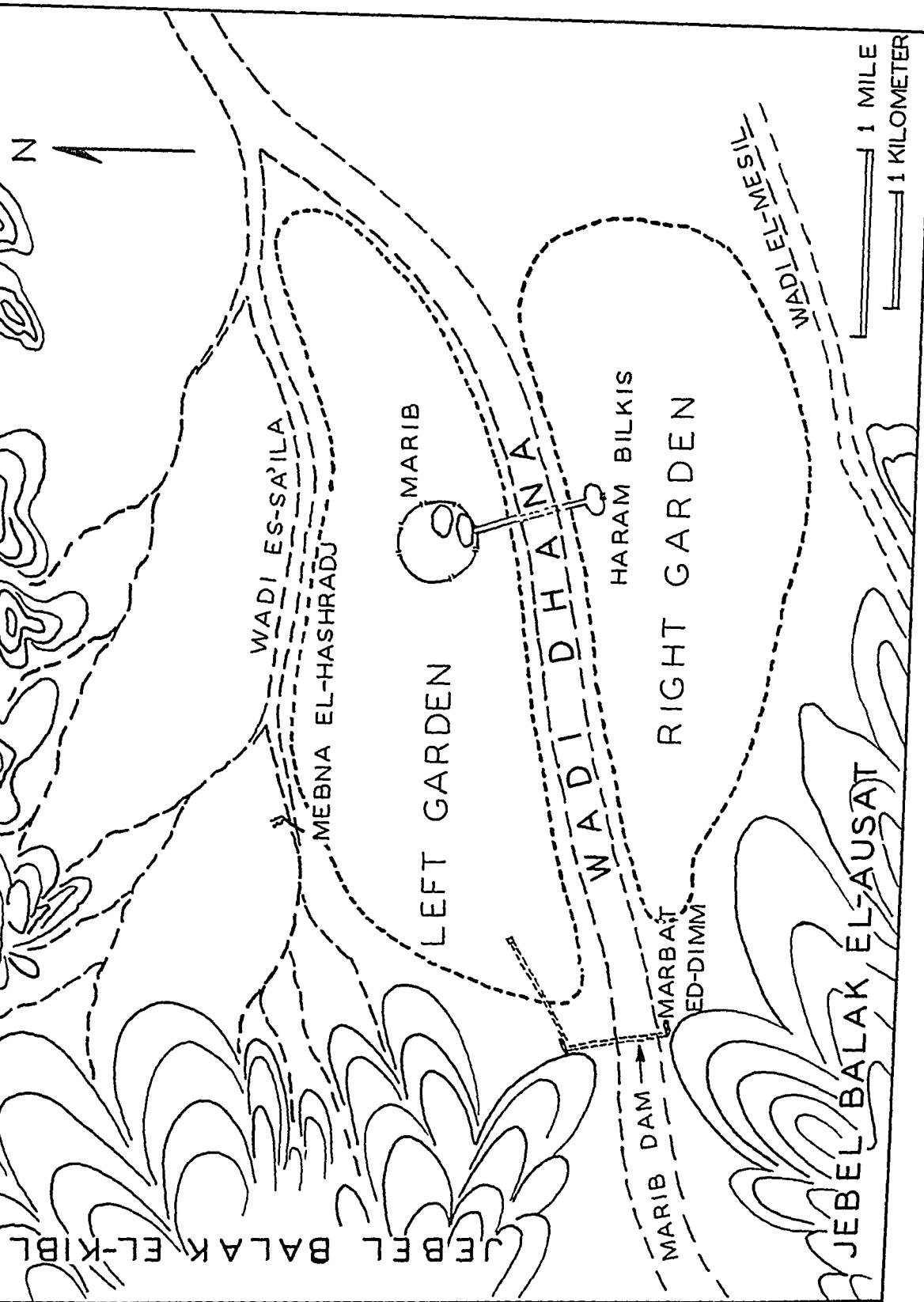
78. A half dozen teams of oxen building a dam across the main bed of the Wadi Beihân. The stone pier at the right is apparently a marker to guide the construction of the dam.



79. Earthen dam across the Wadi Beihân at Nuqûb. There is almost 2 m. of water behind the dam, but much more is needed before the fields can be flooded.

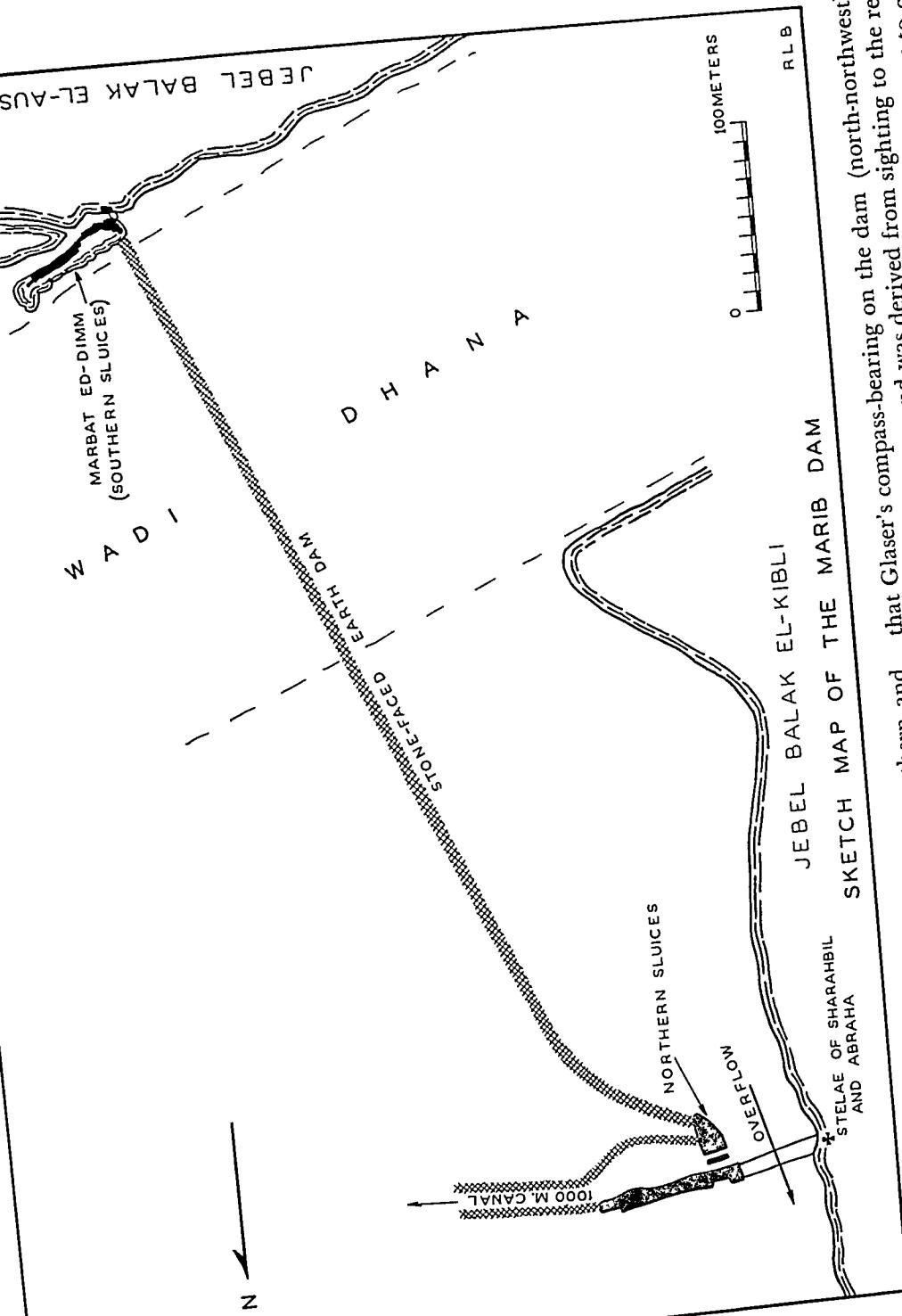


80. Map of the Hamad area showing the areas today irrigated by two small wadies. Earth and stone revetments are run into the bed of the wadies diverting part of the flow on the fields and yet most of every *seil* is lost.



81. Sketch map of the Mārib area modified from Glaser. The scale has been added to Glaser's original map from approximate measurements made by the American Foundation between the dam and Mārib. The location of the "two gardens" mentioned in the Qurān is indicated. (Map based on Plate 4 of *Eduard Glasers Reise Nach Mārib* by Müller and Rhodokanakis.)

n in Ancient Qatabān (Beihān)



82. Sketch map of the Marib dam showing the northern and southern sluice systems, with the approximate location of the stone-faced dam. This is a reconstruction based on Glaser's sketches of the two sluice systems published in the *Encyclopédia of Islam*, on Glaser's estimate of the distance between the two works (770 paces), and on Glaser's statement that the dam ran north-northwest. The scales (1:1500, 1:750, etc.) and the scale in paces published with the southern and northern sluices indicated that Glaser's pace was about 0.75 m. long. It is assumed

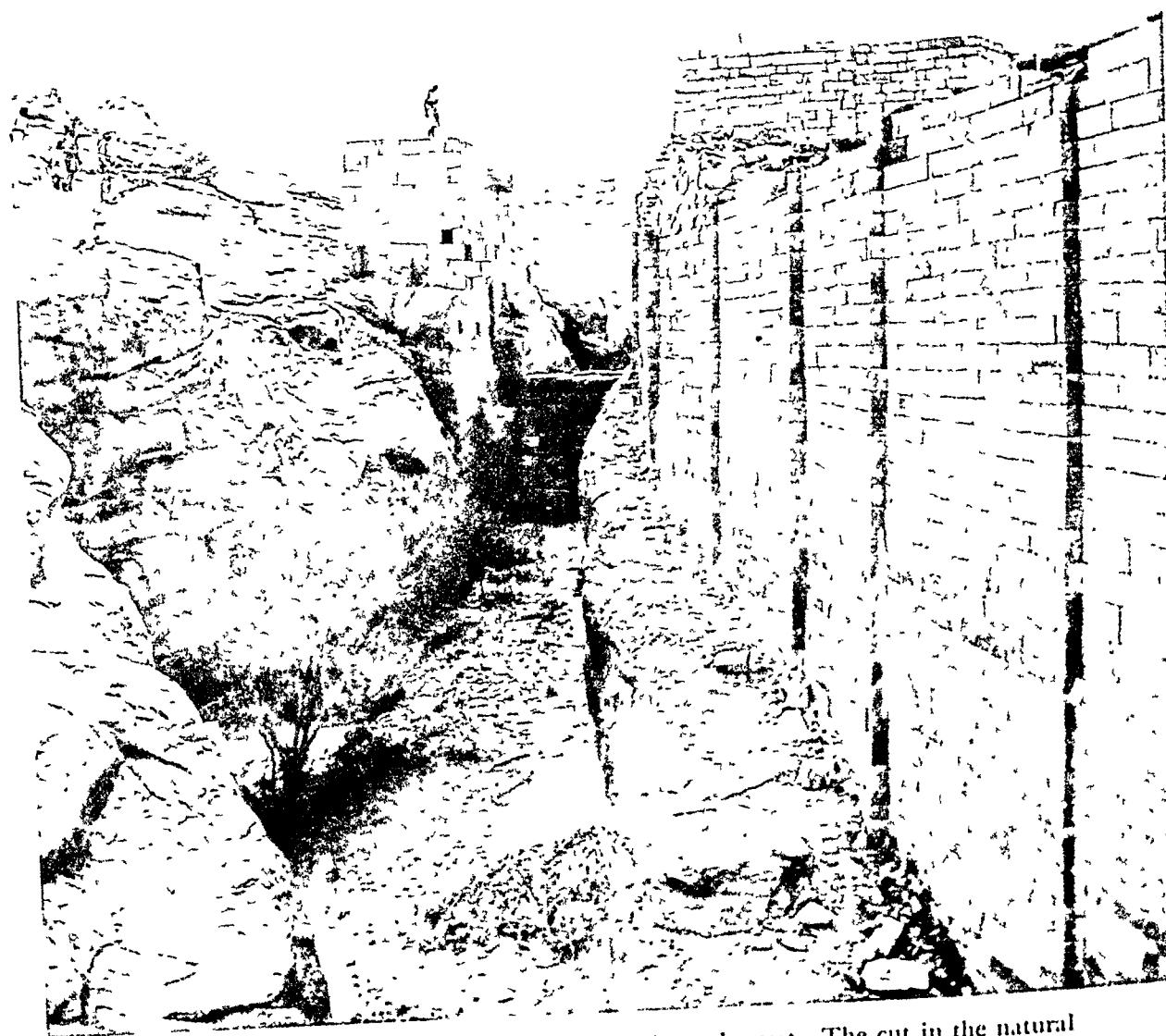
that Glaser's compass-bearing on the dam (north-northwest) was for the straight part and was derived from sighting to the remaining section of the dam from the south. It is necessary to change the north point of Glaser's sketch of the northern sluices by rotating it 45° to the west since Glaser stated that the 1000-meter canal ran almost due east, while his sketch showed it running northeast. The basin at the head of the northern sluices is based on information supplied by Bruce Condé.



83. Southern sluice system of the Mārib dam as seen from the wadi bed to the north. The south abutment of the dam is the tallest pier and rises about 14 m. above the wadi bed. (American Foundation photograph.)



84. Southern sluice system of the Mārib dam as seen from the rock above.
Water flowed to the right in front of the long wall to the "right garden."
"Left garden" is seen in the background. (American Foundation photograph.)



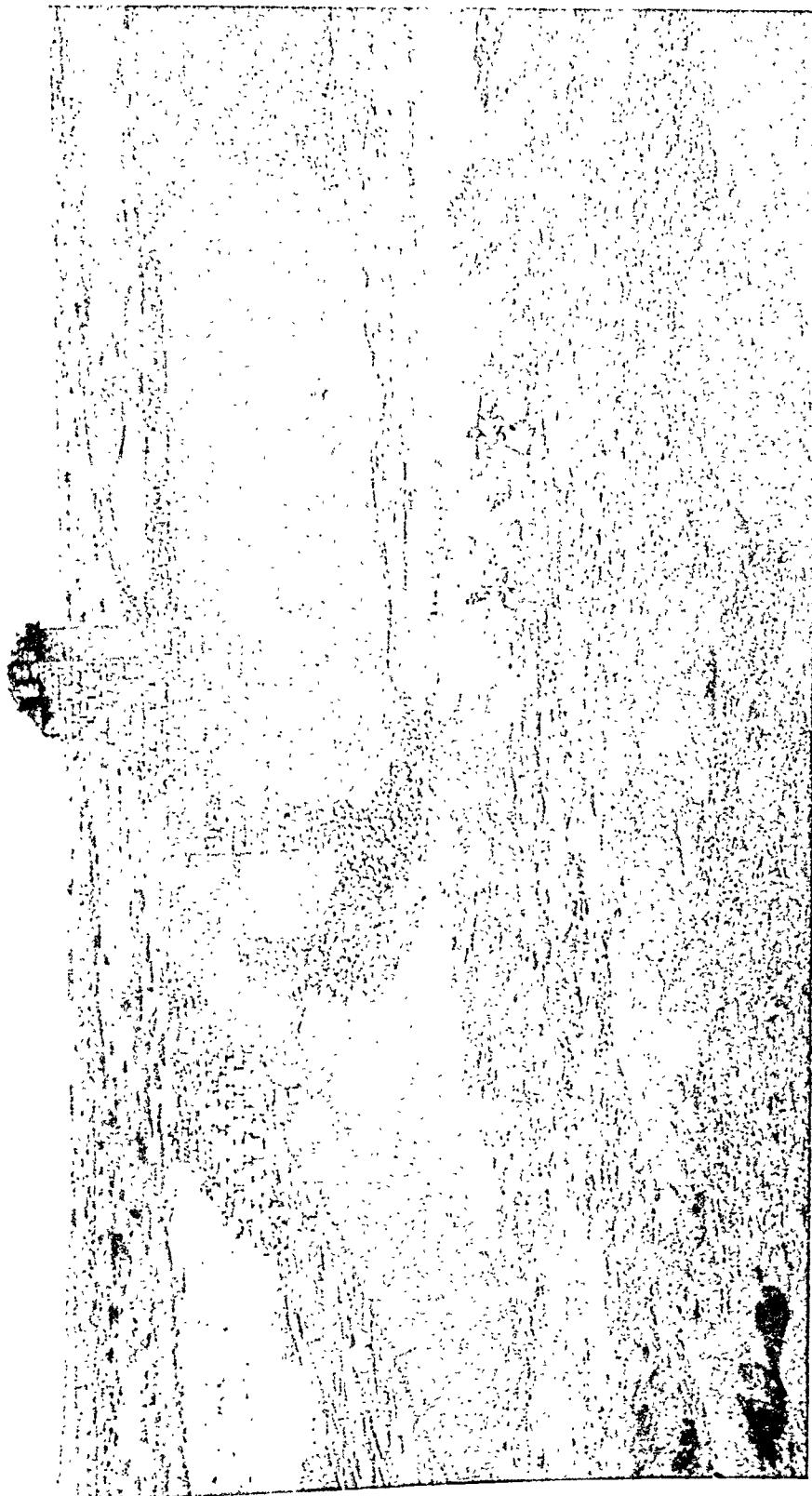
85. Exit of the southern sluices as seen from the east. The cut in the natural rock can be seen under the left pier. This cut was partially walled up later when the area behind the dam silted up. (American Foundation photograph.)



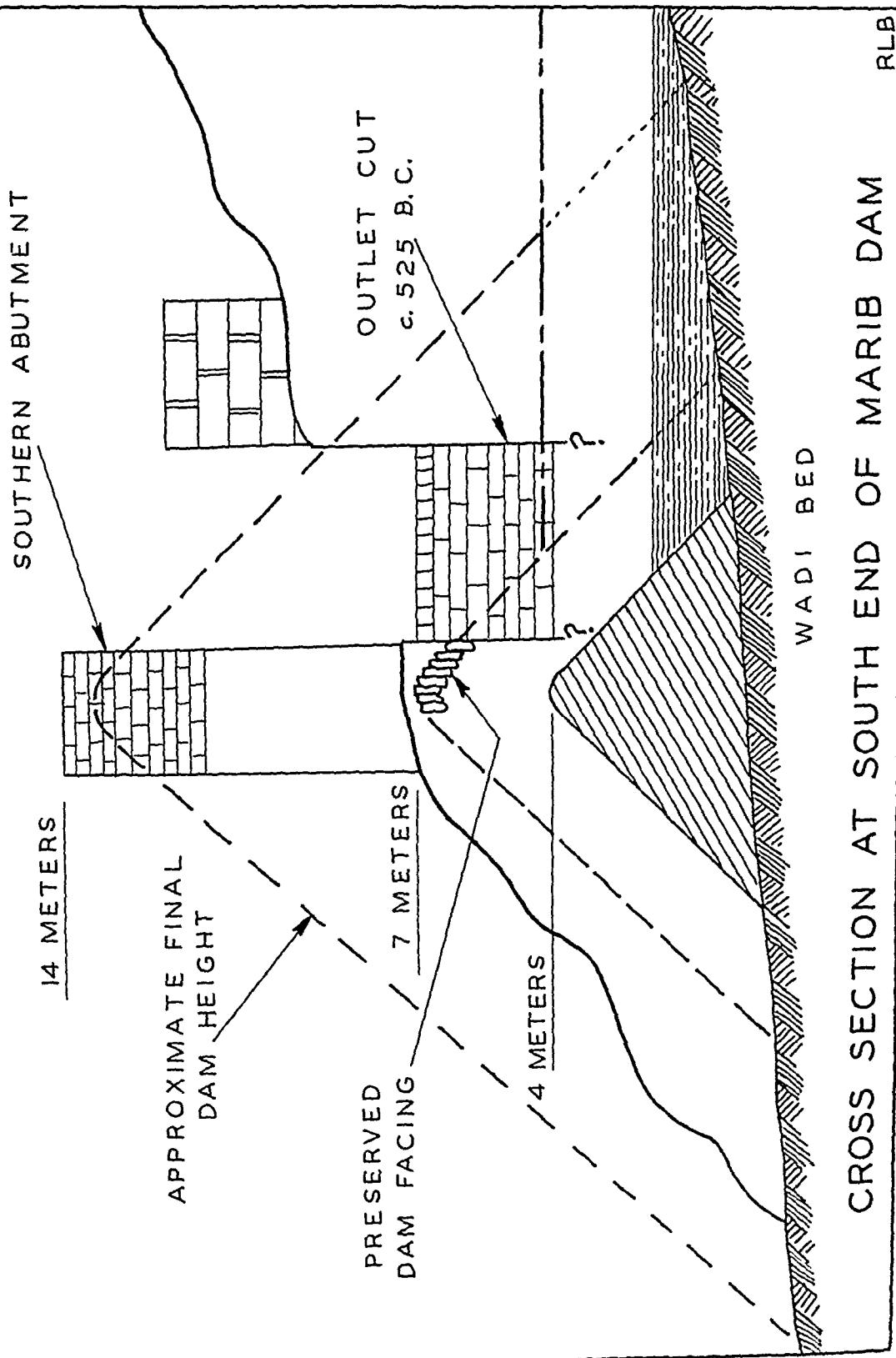
86. Close-up of southern abutment, the high stonework at the right. The space between the abutment and the adjoining stonework is a stairway. The cut in the natural rock can be seen at the right. (American Foundation photograph.)



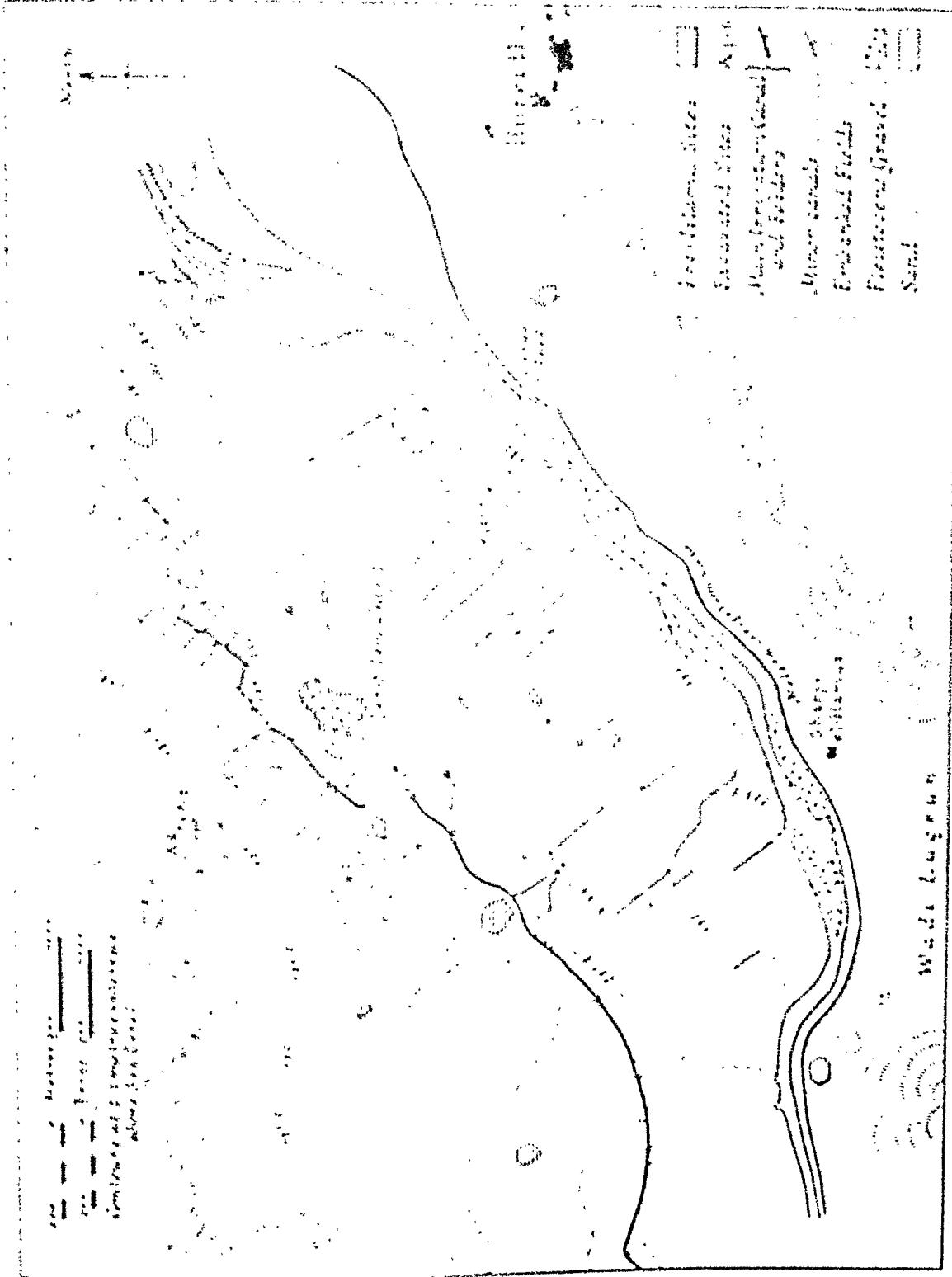
87. Ruins of the northern sluice system as seen from the west. Remnants of stratified canal silt which accumulated behind the dam can be seen to the right. The overflow is in the center of the photograph abutting on the rock in the foreground. (American Foundation photograph.)



88. Ruins of the northern sluice system as seen from the southwest. Gray canal silt which collected behind the dam can be seen to the right. The northern end of the stone-faced earthen dam is seen in the extreme right behind the gray silt. Overflow is to the left. (American Foundation photograph.)



89. Reconstructed cross section of the southern end of the Mārib dam as seen from the north. This is a rough sketch made from Glaser's estimates of heights and from the photographs published above. Note that the outlet shown is actually at right angles to the cross section of the dam, rather than parallel as shown schematically in the sketch.



by 1870 and the first steamship to cross the Atlantic, the *Great Western*, in 1838.



Appendix I

BURIAL MONUMENTS OF SOUTH ARABIA

Richard LeBaron Bowen, Jr.

Most South Arabian explorers and archaeologists have reported burial monuments of some sort. In Minaean country at Ruwaiq and 'Alâm 'Abyadh, Philby reported thousands of cairns.¹ They were circular and usually built of flat limestone slabs (2 to 10 cm. thick). Varying greatly in size, they ranged up to 8 m. in diameter and 3 m. in height. Philby aptly calls them "pillboxes," and so they appear, with vertical sides and flat tops. However, some of the cairns were just heaps of stone no more than a meter high. Many of the large ones had an opening leading to an interior chamber about 1.8 m. long, 1.5 m. wide, and 1.5 m. high. The corridor and chamber were covered with large slabs and the whole was covered with dirt and gravel to the height of the outside wall. These monuments usually ran in single lines along the edge of the summits of ridges, and normally there were lines running down gentle slopes from the lines along the ridges. There were also similar cairns near Nejrân, and on some of these Philby found Himyaritic inscriptions. Ruwaiq and 'Alâm 'Abyadh are rock outcrops in the desert. Forty miles to the west Philby found the Himyaritic ruins of *YLT* at Khirbet Sa'ûd.

Miss Caton Thompson excavated two cave-tombs cut in the scree-slopes of the Wadi 'Amd near Hureidha in Hadhramaut.² These cave-tombs were dated by her in the fifth and the fourth centuries B.C. on the basis of some beads

¹ H. St. J. B. Philby, *Sheba's Daughters* (London, 1939), pp. 373, 379.

² G. Caton Thompson, *The Tombs and Moon Temple of Hureidha (Hadhramaut)* (Oxford, 1944), pp. 65, 153.

and seals. They contained pottery and other offerings in addition to bones. The tombs were undoubtedly ossuaries containing various bones of a number of individuals. In her discussion of these, Miss Caton Thompson states that "circular stone cairn-tombs . . . if tombs they be . . . found by Mr. Philby at Ruwaiq and 'Alam Abyadh . . . have not been recorded in the Hadhramaut. The occurrence of such structures is not to be expected in the valley for topographical reasons."³ Presumably she refers to the main valley of the Wadi Hadhramaut, where the valley walls rise almost precipitously and it is difficult to gain access to the top of the plateau. However, this does not hold for the tributary valleys which start at the level of the Jôl, as shown by the work of this writer and other explorers.

In his last trip to South Arabia, van der Meulen traveled by camel across the Jôl from 'Aiyâd in Wadi Jirdân to Mekheiya in Wadi 'Amd.⁴ This part of the Jôl is known as Jebel Sôt, and van der Meulen, who was the first explorer to pass through this country, states that the Jôl at this point is a prosperous area, with many hollows where there are small settlements with cultivated fields and 'elb trees, and that in some places there are pools for the watering of flocks.

Along the slope of the wadi by means of which they left the lowlands, and on the tops of hills,

³ *Ibid.*, p. 67.

⁴ D. van der Meulen, *Aden to the Hadhramaut* (London, 1947), pp. 119, 122, 127.

van der Meulen reports that there were rows of stone-heaps, visible as dark specks far away. These proved to be loose piles of stones, stretching in low rows in at least two directions from larger piles of stone that lay in the middle of them. Van der Meulen states that these stone-heaps were cubes, about a yard square and a yard high, all similarly shaped and spaced at regular intervals. An idea of the number of cairns may be gathered from van der Meulen's statement that "Wherever we looked we observed these cubes standing out sharply against the unchanging, empty horizon."⁵ This account agrees with Philby's description of the tombs at 'Alám 'Ab-yadh and Ruwaiq, in respect to rows of monuments running in two different directions. The two groups differ basically in that those described by van der Meulen were apparently all square and equally spaced, while those seen by Philby were all circular, and not uniformly spaced. Also on Jebel Sôt, before descending toward the hamlet of er-Rôdah, van der Meulen reports seeing a number of small heaps of stone, some round, some oval. Near one of these stood two well-cut square columns of stone 1.2 m. high, and linked up with these were flat stones set in a rectangle. Later, almost in the Wadi 'Amd, van der Meulen reports that on the outskirts of a hamlet (still on the Jôl) there were some unusually big stone piles, some square and composed of great blocks, and others in the form of open rings of upright slabs.

Freya Stark has also reported some burial monuments on the Jôl.⁶ She relates that at Ṣuwaidât, on the plateau edge above Wadi Sobale, there was a square building (5.8 x 5.5 m.) of well-dressed blocks resting on the limestone. Nearby were circular ruins of stone. Two graves were also found, built of roughly dressed stones and covered with a mound; in one a Himyaritic inscription was discovered.

Mrs. Ingrams reports several burial monuments in Hajar Province.⁷ On a ridge called Ras Sherâra overlooking Wadi Hauradî and Wadi Sarafa, she discovered a number of large

piles of heaped stones. At Qarîf bâ Dala she found many heaps of stones set in circles with large upright stones in the midst of them. Nearby were four large stones bearing Himyaritic inscriptions. Not far away was a modern cemetery which included some pre-Islamic monuments. There were some wide circles of stones filled in with pebbles, and there was one stone set upright in the center of a circle.

Farther on, near the settlement of Jizwil, there were some large mounds of stone and earth, which Mrs. Ingrams says were similar to those she saw at Hajarein, Meshhed, and Ḥureidha. On top of the mounds were stones piled a meter high and arranged in a rectangle, the center of which was filled with pebbles. The place was known as Qubûr el-Kuffâr ("Infidels' Grave"). Mrs. Ingrams found Himyaritic ruins, Himyaritic inscriptions, and "incense trees" scattered through the whole region. Presumably these incense trees were myrrh trees.

Van der Meulen made a trip across the northern Jôl from Tarîm towards the Rub' el-Khâli, and described some amazing cairns.⁸ These cairns were in the form of pyramids and were arranged in single rows. There were also rings of stone associated with these pyramids. The pyramids were small and set about a meter apart. Near one group van der Meulen found a flat slab with Himyaritic inscriptions cut on the face.

Ingrams also made a trip across the northern Jôl (to the west of van der Meulen's route), and reports that at 'Urum, near the head of Wadi Qubhudh, there were strange burial monuments.⁹ Ingrams found circular ruins on hills, heaps of stones in straight lines along the crests of slopes, and straight lines of upright stones.

B. Thomas, who visited the Dhofâr region and found frankincense trees growing wild in the Qara Mountains, also discovered strange groups of monuments in these mountains.¹⁰ These were found in Wadies Sarab, 'Ainain, Banât er-Raghâif, Haradha, Andhaur, Dhâghauba, Dhikur, Ba Musqaiyif, and near a well at Aiyun. The monuments were essentially alignments of triliths, each of which usually con-

⁵ *Ibid.*, p. 119.

⁶ F. Stark, "An Exploration in the Hadhramaut and Journey to the Coast," *Geographical Journal*, 93 (1939), p. 7.

⁷ Mrs. H. Ingrams, "Excursion into the Hajar Province of Hadhramaut," *Geographical Journal*, 98 (1941), pp. 121, 132.

⁸ D. van der Meulen, *op. cit.*, pp. 193, 199, 203.

⁹ W. H. Ingrams, "Hadhramaut: A Journey to the Ser'a Country and Through the Wadi Masella," *Geographical Journal*, 68 (1936), p. 538.

¹⁰ B. Thomas, *Arabia Felix* (New York, 1932), pp. 120, 128.

sisted of three long stones about a half meter high standing on end and leaning toward each other. Each pile was about a pace and a half from its neighbor. Sometimes a trilith had a fourth small stone on top, and occasionally a series of triliths was enclosed with an elliptical line of small pebbles. The number of monuments in the alignments varied somewhat, containing 5, 7, 9, 11, and 15 triliths. Running parallel to each of the larger series about three paces away was a smaller series of large conical rubble heaps. Thomas reports that "inscriptions" were found on some of the stones composing the triliths, but these are apparently only scribblings, although there appear to be some repeating symbols. Presumably these triliths are similar to the "pyramids" van der Meulen reports from the northern Jöl.

Carter noted several other instances of burial monuments along the southern shores of Arabia.¹¹ At Ras Resút, he found an ancient burial ground covering about three acres. The graves were marked by circles of large boulders surrounding heaps of loose stones. The larger heaps measured 6 to 12 m. in diameter and reached a height of about two-thirds of a meter above the plain. Around the larger graves were smaller ones cooped to their circumference. There were ruins of buildings scattered all over the cape. West of Damkot, Carter reported an extensive burial ground similar to that of Ras Resút, consisting of beds of stones encircled by large boulders.

Thesiger has reported triliths and tumuli from interior Oman.¹² He relates that there were a few on the banks of Ithli, a few in Wadi 'Amairi, near the western end of Jebel Salakh, and a few in the Andam. He states that these were similar to the Dhofár triliths and that they were always associated with tumuli. Thesiger also relates that tumuli are especially common on the cliffs around Jabrin.

On the way to Beiħān in 1950 the American Foundation Arabian Expedition passed through the lower part of Wadi 'Adim in Hadhramaut. Although this wadi is the most frequented caravan route from Shiħr and is now one of the motor roads to Hadhramaut, Bent is the only

explorer to have traversed some parts of it, although many British political agents are familiar with it. Bent entered the wadi about eight km. north of Sāh from the Jöl to the west. He traveled south up the wadi on his way to the coast. When Philby motored to the coast in 1936 he followed a route to the east of 'Adim. As one comes down the wadi from the south, the first large town and sizable area of cultivation is Sāh. Bent states that south of Sāh "the Wadi becomes narrow, stony, and uninteresting."¹³ Actually the wadi south of Sāh is extremely interesting, although not from a geographical point of view. Starting about 3 km. south of Sāh and continuing on from 8 to 11 km., the brink of the canyon walls on both sides of the wadi was lined with hundreds of cairns. Some of these were in perfect pillbox shapes, while others were simply mounds of stones. Sometimes the pillboxes had perfectly vertical sides, but in other instances there was a slight batter. In some places there were simply circles of stones. In one place between two large cairns there were 20 small piles of rock (30 to 50 cm. high) spaced 2 to 3 m. apart (Plate 91).

There were never more than two or three cairns in a group, separated by 20 to 40 m., and often the cairns were alone. Many of the ones I examined had caved in, but apparently all had a similar plan of construction. It consisted of a crude chamber with a vaulted roof and with smaller rocks piled on top of the vault forming rock mounds or pillboxes, as the case may have been. It was the vault that had caved in. The mound type was 4.5 to 5.0 m. in diameter and 0.9 to 1.2 m. high (Plate 92), while the pillbox type was considerably larger, measuring about 6 m. in diameter and about 1.5 m. high (Plate 93). The vaults inside were about 1.2 to 1.5 m. in diameter. One pillbox I examined had two projections set at 90° to each other which may have been entrances similar to those that Philby found.

The most interesting fact about these cairns was their location on the canyon walls. In most instances they were silhouetted to their full height against the blue Arabian sky when viewed from the valley (Plate 94). However, inspection showed that they were not on top of the Jöl, but were built on the highest point that could

¹¹ H. J. Carter, "Geography of the Southwest Coast of Arabia," *Journal of the Bombay Branch of the Royal Asiatic Society*, III (1851), pp. 262, 263, 269.

¹² W. Thesiger, "Desert Borderlands of Oman," *Geographical Journal*, 116 (1950), p. 153.

¹³ T. Bent, *Southern Arabia* (London, 1900), p. 173.

still be visible from the valley floor. If they had been built on the highest point of the canyon wall, they would not have been visible from the valley, since the wall edge sloped away at the top. Thus it would seem that these cairns were intended to be seen from the valley below. There are some exceptions to this, where cairns were built at a lower level, usually below ones that were visible from the valley. These too could be seen from the valley, but obviously they were not silhouetted.

Nigel Groom told me that he had seen about a dozen pillbox monuments in Beihān near Luwa pass, which leads to the Gamalia plateau country to the south of el-Harajeh. He described these structures as about 2.4 m. in diameter and 1.2 m. high, built of small flat unhewn stones, and bearing an extraordinary resemblance to those reported and illustrated by Philby from Jauf.

Some people have doubted that Philby's pillbox cairns were tombs. The main objection seemed to be that many of the cairns were not large enough to hold a human body. Inasmuch as the excavations in Beihān, at Hureidha, and

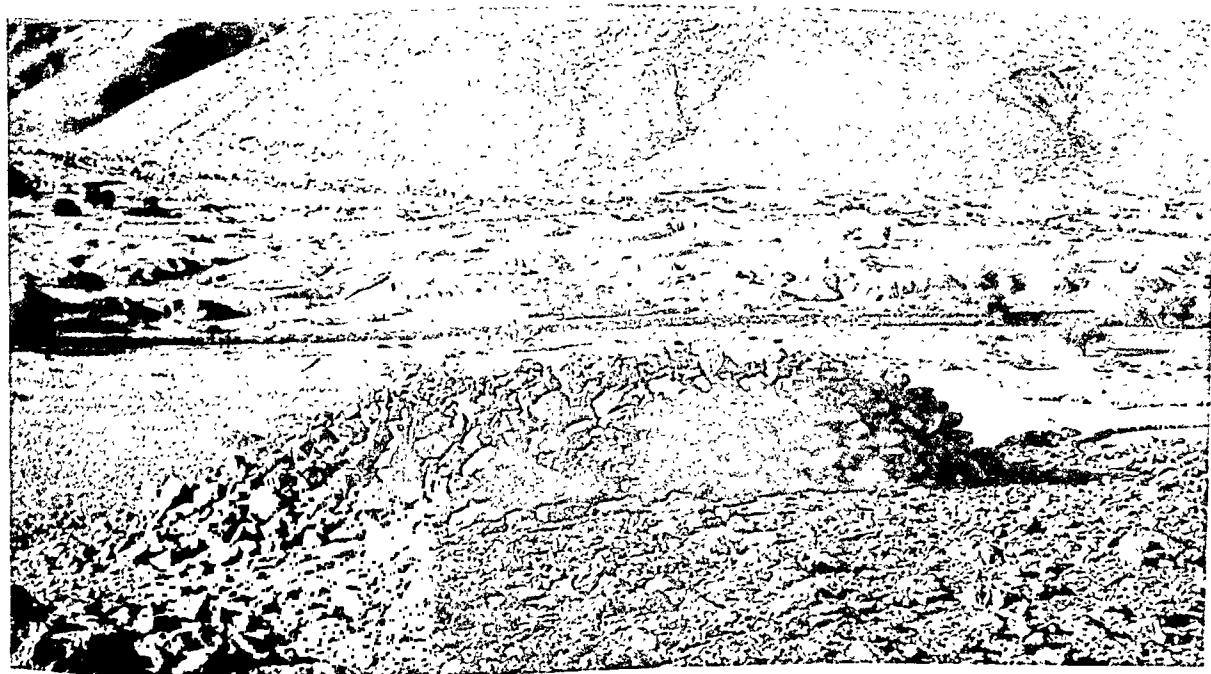
on Bahrein Island,¹⁴ all seem to indicate that tombs in ancient Arabia often served only as ossuaries, the size of the tomb has little significance. Since Philby found Himyaritic inscriptions on some of the Nejrān pillbox tombs, it seems that they are probably Himyaritic. The circumstantial evidence would seem to indicate that most of the other cairns in South Arabia are of Himyaritic origin, with a probable range from 1000 B. C. to the early centuries A. D. However, it must be borne in mind that there is evidence that the modern Bedouins in some areas of South Arabia bury their dead under cairns,¹⁵ and W. F. Albright has told me that the Sinai party of the University of California African Expedition in 1948 found evidence proving that a modified type of pillbox cairn was used as a group tomb by the Arabs of southern Sinai during the past few centuries. Thus cairns have a possible range from Himyaritic times to the present in South Arabia. Hitherto no Bronze Age or Stone Age monuments have been identified in South Arabia.

¹⁴ R. LeB. Bowen, Jr., *The Early Arabian Necropolis of Ain Jawan* (New Haven, 1950).

¹⁵ D. van der Meulen, *op. cit.*, p. 204.



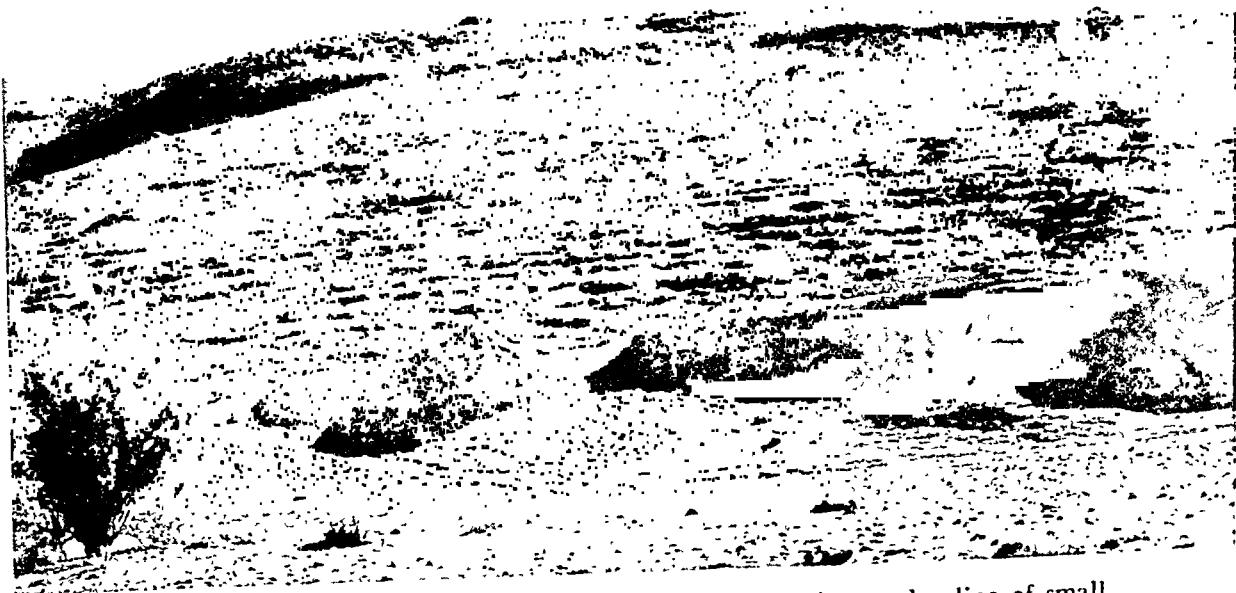
91. Wadi 'Adim south of Sâh. Small piles of stones 30 to 50 cm. high between larger cairns along the edge of the Jôl in the foreground.



92. Wadi 'Adim south of Sâh. Mound cairn ranging from 4.5 to 5.0 m. in diameter and about a meter high.



93. Wadi 'Adim south of Sâh. Pillbox cairn about 6 m. in diameter and 1.5 m. high. The sides are usually vertical.



94. Wadi 'Adim south of Sâh. View of two large cairns and a line of small ones to the left as seen from the valley floor. They are not on the highest part of the Jôl, but are placed so that they are silhouetted against the skyline.

Appendix II

ANCIENT FRANKINCENSE-PRODUCING AREAS

Gus W. Van Beek

There can be no doubt that the frankincense-producing areas in antiquity were the same as they are today, the mountains of northern Somaliland and Dhofar. We have the testimony of classical writers that it was precisely these areas that provided the world market with this valuable commodity. The first-hand account of the flow of commerce in this area contained in *The Periplus of the Erythraean Sea* is particularly enlightening. The author distinguishes two kinds of frankincense, "far-side" and "sachalitic." "Far-side" frankincense was grown in the mountains bordering the northern coast of Somaliland, east of modern Berbera,¹ and shipped from Malao, Mundus, Mosyllum, and the Market of Spices.² It was probably exported also from the Red Sea port of Muza in Arabia since the list of exports include "all the things already mentioned from Avalites and the far-side coast."³

It is important to note in this connection that myrrh is specifically reported to have been shipped only from Avalites, Malao, Mundus, and Mosyllum in Africa, and from Muza in Arabia. With regard to the African coast, the fact that Malao, Mundus, and Mosyllum exported both frankincense and myrrh indicates that the areas in which these products were grown geographically overlapped, though they were not necessarily identical. The inclusion of Avalites on the

west and the exclusion of the Market of Spices on the east in the list of myrrh ports show that the myrrh-producing area was confined to the western half of northern Somaliland while the far-side frankincense-producing area was centered in the eastern half. The geographical limits of these areas as described in the *Periplus* have been strikingly confirmed by the excellent study of R. E. Drake-Brockman.⁴ Both Pliny⁵ and Strabo⁶ mention the growth of myrrh along the northern coastal region of Somaliland, and Strabo, in particular, describes approximately the same geographical distribution of myrrh and frankincense as recorded in the *Periplus*. In view of the fact that Muza is the only Arabian port from which myrrh was exported, we are probably justified in assuming that the economically important myrrh-producing area of Arabia was largely confined to the southwestern part. Support for this suggestion is found in Ptolemy's *Geography*, sixth map of Asia, where the *Smyrnophoros Interior* and *Smyrnophoros Exterior* are located to the north and northwest of Arabian Emporium [Aden]. From this general region, myrrh must have been transported to Muza by camel caravan.

To return to frankincense, the second kind mentioned in the *Periplus* is "Sachalitic" frankincense which was grown in the mountains behind Sachalite Bay. Precisely where this bay and the land of the Sachalites were located is

¹ See R. E. Drake-Brockman, *British Somaliland* (London, 1912), pp. 305 f.

² *The Periplus of the Erythraean Sea*, translated and annotated by W. H. Schoff (New York, 1912), pars. 7, 8, 10, 11, 12.

³ *Ibid.*, par. 24.

⁴ *Op. cit.*, pp. 302-306.

⁵ Pliny, *Natural History*, translated by H. Rackham (Loeb Classical Library, London, 1945), 12: 30, 33, 35.

⁶ *The Geography of Strabo*, translated by H. L. Jones (Loeb Classical Library, London, 1930), 16. 4. 14.

not clear from the *Periplus* except that it was beyond, i.e., to the east of, Cana [Qana].⁷ It may have included the area eastward from Cana or Shihr or it may have begun at Syagrus [Ras Fartak] and extended eastward; unfortunately this is one of the few places where an approximate distance was not given by the author. Here, however, Claudius Ptolemy, writing in the first half of the second century A.D., enables us to define the area precisely. Referring to Marinus' mistakes, he notes:

In addition to these mistakes he gives us some further assignments of localities with which the knowledge of our times does not agree. For example he places the bay of Sachalita [sic] on the western shore of the promontory of Syagros, but all who navigate these parts unanimously agree with us that it is toward the east from Syagros, and that Sachalita [sic] is a region of Arabia, and from it the bay of Sachalita [sic] takes its name."⁸

The ambiguity of the *Periplus* in this instance probably results from conflicting reports given to the author.

The frankincense-producing area (the land of the Sachalites) is clearly confined to the mountains surrounding the Bay of Omana [Qamr Bay]. The *Libanotophoros* region on Ptolemy's sixth map of Asia is precisely in this area and nowhere else in Arabia. It should be noted that Carter's observation⁹ regarding the location of this region on Ptolemy's map is unnecessary; considering the general character of his sources, the remarkable thing is that Ptolemy located it as precisely as he did. Of the three frankincense ports on the southern coast of Arabia, Cana, Syagrus, and Moscha, only two, Syagrus (a storehouse for the collected frankincense) and Moscha (the more important commercial port) handled frankincense brought down directly from the mountains, and both are located on this bay; with regard to Cana, we are specifically told that frankincense was brought ". . . to Cana on rafts held up by inflated skins after the manner of the country, and in boats"¹⁰ showing that it was

not native to the region inland from Cana. It seems, therefore, that the two areas in which this commodity was grown are the northern mountains of the Somali peninsula and the Qara mountains of Dhofar; there is absolutely nothing in the *Periplus* or Ptolemy's *Geography* to suggest that frankincense was produced in the Wadi Hadhramaut.

While failing to mention the frankincense-producing area of Somaliland, Pliny indicates that the region in Arabia where frankincense was grown is an "eight days' journey from Sabota"¹¹ which places it well beyond the Wadi Hadhramaut and in the general direction of Dhofar.¹²

Strabo,¹³ in agreement with the *Periplus*, notes that frankincense is native to the area of northern Somaliland bordering on the Gulf of Aden. With regard to Arabia, however, his assertion that "Cattabania [Qatabân] produces frankincense, and Chatramotitis [Hadhramaut] produces myrrh"¹⁴ is clearly wrong in the light of what we know from other sources and from modern investigation. It may reflect a mistake in the sources used by Strabo (in this instance Eratosthenes), by Strabo himself, or in the transmission of the text. The names of the products have simply been reversed so that we must read here, "Qatabân produces myrrh, and Hadhramaut produces frankincense." In this instance "Hadhramaut" does not refer to the Wadi Hadhramaut, but to the entire country just as its parallel "Qatabân" designates a political entity. It will be remembered that at this time the Hadhrami state, with its capital at Shabwa, included not only the Hadhramaut area but also the land of the Sachalites as we know from numerous inscriptions found in the region of Dhofar.¹⁵

Modern exploration and investigation have confirmed the testimony of the classical writers with regard to the location of the South Arabian frankincense-producing areas. Both Carter and Bertram Thomas have shown that the only region in the Arabian peninsula where frankincense is still grown is the coastal mountain range of Dhofar between longitude 53° and 55° 21' E

⁷ *Op. cit.*, par. 29.

⁸ *The Geography of Claudius Ptolemy*, translated by E. L. Stevenson (New York, 1932), Book I, xvii, p. 37.

⁹ See H. J. Carter, "A Description of the Frankincense Tree of Arabia with Remarks on the Misplacement of the 'Libanophorous Region' in Ptolemy's Geography," *The Journal of the Bombay Branch of the Royal Asiatic Society*, II (1848), pp. 380-90.

¹⁰ *Periplus*, par. 27.

¹¹ *Op. cit.*, 12: 30.

¹² Contrast A. Grohmann, *Südarabien als Wirtschaftsgebiet*, I, pp. 129-34.

¹³ *Geography*, 16. 4. 14.

¹⁴ *Ibid.*, 16. 4. 4.

¹⁵ F. P. Albright, "Explorations in Dhofar, Oman," *Antiquity*, 113, p. 38.

(Carter's figures, taken more than 100 years ago, vary only 3 minutes on the west and 2 minutes on the east from those given by Thomas), roughly between Damghut and a point just beyond Ras Marbat, at an elevation between 2,000 and 2,500 feet.¹⁶ The growth of this plant apparently requires a special combination of various geographic and climatic factors which is found only in this area, so that there can be no doubt that the ancient frankincense groves of South Arabia were also confined to this region.

That the area now known as Dhofār is to be identified with Sachalites in the *Periplus* and Ptolemy's *Geography* has been definitely established by the discoveries of F. P. Albright at Khōr Rōri. In the course of his excavations of the ancient fortress overlooking the bay, he found inscriptions giving the ancient name of the town as SMRM [Sumuram] and that of the land as SKLHN [Sa'kal] which would be rendered in Greek transcription "Sachalites" as noted by W. F. Albright.¹⁷ In this connection it should be noted that the identification of Hebrew *Shlt* (Exod. 30:34) with "Sachalites" suggested by Hommel¹⁸ is impossible, since we now know that the Greek reflects the South Arabic SKL.

The harbor of Moscha cannot be precisely located on the basis of the available material. Schoff's proposed identification of Moscha with the site at Khōr Rōri¹⁹ is attractive owing to the fact that it is the best harbor on the Dhofār coast²⁰ and to the harmony of the actual geographical setting with that described in the *Periplus*. But it is difficult in view of the inscriptions noted above which give the name of the fortress as SMRM. The problem is further complicated by Ptolemy's *Geography* which places Moscha Harbor to the west of Syagrus [Ras Fartak] and none of the villages listed to the east of Syagrus corresponds to either Moscha or SMRM.²¹ It is possible, however, that while SMRM was the name of the fortress, Moscha may have been the

¹⁶ B. Thomas, *Arabia Felix* (London, 1932), p. 123 and H. J. Carter, *op. cit.*, pp. 387 ff.

¹⁷ Review of J. Ryckmans, *L'institution monarchique en Arabe Méridionale avant l'Islam*, in *Journal of the American Oriental Society*, 73, no. 1, p. 39, note 7.

¹⁸ In H. V. Hilprecht's *Exploration in Bible Lands* (Philadelphia, 1903), pp. 700 f.

¹⁹ W. H. Schoff, *Periplus*, pp. 140 ff.

²⁰ See F. P. Albright, *op. cit.*, pp. 37 ff.

²¹ *Op. cit.*, vii, pp. 137 ff. and the sixth map of Asia.

name of the harbor installations and warehouses nearby just as the fortress *MIVYT* [Huṣn el-Ghurāb] overlooked the port facilities of *QN* [Bir 'Ali].²² The identification of the fortress at Khōr Rōri with SMRM, therefore, does not rule out the possibility that Moscha was located in the immediate vicinity.

Frankincense Commercial Routes

The ports from which the "far-side" frankincense was exported have been noted above and, in the time of the *Periplus* (c. 50 A.D.), it seems that the bulk of the frankincense grown in the Somali peninsula was transported by seagoing vessels. With regard to the Sachalitic or Dhofār frankincense, the same situation existed. It is probable that most of the frankincense, which had been gathered during the summer months and collected in the autumn,²³ was stored in Syagrus and Moscha and then shipped by raft and boat to Qana, the primary Hadhrami port, during the winter when the winds were favorable owing to the northeast monsoon. B. Thomas has observed that this collecting-storing-shipping schedule is maintained today for this reason.²⁴

At Qana, the frankincense which had been brought there in native boats was transshipped by sea eastward to Omana (on the Persian Gulf where it was transshipped to Mesopotamia and Persia) and Barbaricum (on the coast of northwest India) according to the *Periplus*, and westward to Egypt; some was transported overland by caravan to Shabwa and/or Timna' northward. It was also exported direct from Moscha and Syagrus (?) eastward and westward.²⁵ In all probability the bulk of the frankincense produced in South Arabia moved over these sea and land routes in the first century A.D. Only when the sea lanes were in peril as a result of piracy²⁶ did the overland routes direct from Dhofār to the Hadhramaut and the north (?) flourish.²⁷

²² See CIH 728 and K. Mlaker, "Die Inschrift von Huṣn al-Gurāb," *Wiener Zeitschrift für die Kunde des Morgenlandes*, 34, p. 72.

²³ See Pliny, *op. cit.*, 12: 32.

²⁴ B. Thomas, *op. cit.*, p. 122.

²⁵ *Periplus*, par. 32. [Omana is a better ms. reading than Ommana—Editor.]

²⁶ See Pliny, *op. cit.*, 6: 101.

²⁷ See the discussion by F. Stark, *The Southern Gates of Arabia* (New York, 1936), pp. 308-15.

The existence of these overland routes has recently been discovered by Wendell Phillips.²⁸ During his travels in the northern part of Dhofâr, he found ancient caravan routes that run northward into the Rub' el-Khâli. It should be noted in this connection that W. Thesiger has listed four modern routes between Dhofâr and the Hadhramaut;²⁹ since the same geographic

conditions exist today that prevailed in ancient times, it is probable that ancient and modern routes follow much the same course. Over these tracks, a portion of the South Arabian frankincense traffic must have always moved and during periods when pirates jeopardized the sea routes, virtually all of it may have moved westward and northward in this way.

²⁸ Oral communication.

²⁹ W. Thesiger, "A New Journey in Southern Arabia," *Geographical Journal*, 108 (1946), p. 139, note 1.

Appendix III

THE SHE'B EDH-DHAQAB INSCRIPTIONS

A. Jamme, W. F.

Jamme 405 and 406 belong to the same construction, carried out by the Qatabanian king Yada'ab Dhubyān Yuhargib. We think that this structure is a well and its enclosure. The palaeography of these inscriptions seems to be attributable to the late fifth or early fourth century B.C., a period which fits in well on the one hand with the epigraphic data mentioned in the commentary and on the other hand with the date of this royal personality.

The texts are reproduced here in facsimile for a better presentation of the palaeography of the inscriptions (Plate 95).

Jamme 405—Oval blue sandstone, the left side nearly rectilinear; photograph and squeeze. W.B. 1/8. This stone was found at a place called She'b edh-Dhaqab near Jebel Murjāh.

I. DESCRIPTION

Stone: greatest thickness, 43 cm.; length, 158 cm.; width, 113 cm.

Inscription: cut on the back of the top and in four parts.

1. Text: Line 1, 143 × 7 cm.; distance to *rymt*, 1 cm. Line 2, 143.5 × 7 cm. Line 3, 144 × 7 cm.; distance to monogram, 1.5 cm.; width between the lines, 1 cm.

2. The two side marks: 17 × 6.8 cm.; that on the right begins at the upper level of line 1 and the other at the height of the top of the initial *w*.
3. The monogram is 18.5 × 7 cm. and is 52 cm. from the edge of the stone.
4. *rymt*: 26.3 × 12.3 cm.; this proper noun begins 35.5 cm. from the right edge of the inscription.

A flaking or splintering of the rock, which gradually thins off towards the right, has obliterated a large area in the middle of the inscription, as well as the lower half of the two last letters of *rymt*; the left side of this area is 0.2 cm. deep; maximum width, 33 cm.; as for the length, see the commentary on each line.

II. TEXT, TRANSLATION, AND COMMENTARY

1. *yd'* *b/dbyn/yhrg* (*b*) [/*bn/šh*] *r* [/] *mlk/qtn* / *wkl/wld/m/ w'wsn/w*
2. *khd/wdhsm/wtbnw* (/) [*bny/*] (*y*) *srn/w'qdsww/rymt/wrḥbt/bn/*
3. *šrsm/d/f̄m/fd* (*f*) [*ns/*] (*m*) *n/ hmqm/wrlds/t̄tr/w'm/wwdm*
1. Yada'ab Dhubyān Yuhargi(*b*) [, son of Šahjar[,] king of Qatabān and all the children of 'Amm and 'Awsān and
2. Kahid and Dahsum and Tabnaw [built ...]

- ...] (Ya)srân and its enclosure Raymat and Rahbat from
3. the bottom to the top, thus he (hi) [d it from] of danger and gave it over to the care of 'Aṭṭar and of 'Amm and of Waddum.

Line 1. Of the right and left strokes of the *b* of *yhrbg*, there remain respectively a half and a quarter. The above-quoted Qatabanian king is known by a fragmentary inscription which mentions only the final invocation (see RÉS 4165/4-7).¹ The distance between the left stroke of *b* in *yhrbg* and of *m* in *mlk* is 21.5 cm.; it requires the restoration of 7 or 8 letter spaces. On the other hand, the squeeze has on the right of *m* a curved mark which cannot be the left part of *m*, since the latter is more angular. We then propose the following restoration [/bn/šh]r[/.]. For *kl/wld/m*: this well-known expression (see RÉS 3550/1) designates the Qatabanian people, who were the children of their principal deity, the moon-god 'Amm.²

Line 1-2. *kl/wld/- - - /wtbnw.* This nomenclature dates from the *mukarrib* period (see RÉS 3550/1-2; 3642 D, and 3880/1-2). It remained in use for a long time, for it is mentioned in T.S.a (inscription from the South Gate of Timna'), which has as its author the king Šahar Ġaylân, son of 'Abšabum. Some of its elements are attested in Sabaean: *khd* in RÉS 3688/2, *dhsm* and *tbnw* in RÉS 3945/7. *dhsm* must not be confused with the gentilic *dhsm* (see Jamme 219-221).

Line 2. The distance between the *w* of *tbnw* and the *s* of (*y*) *srn* is 26.5 cm., which presupposes 10 or 11 letter spaces. An interesting parallel is found in RÉS 4626/1 (Sabaean): 's/y/m'hdhmy/ysrn/bn/mw̄t̄rm/'dy/šqrn. The expression *bn/šrsm/’d/fr̄m* shows that we are dealing with building; *bny*, "build," is a better restoration than 's', "brick up." The term 'dd may be used either of *m'hd*, "reservoir," *hrt*, "aqueduct," or *b'r*, "well." The first is hardly suitable, since it involves 4 spaces, whereas there

¹ W. F. Albright, "The Chronology of Ancient South Arabia," *Bulletin of the American Schools of Oriental Research*, no. 119 (1950), pp. 5-15.

² A. Jamme, "Le panthéon sud-arabe préislamique d'après les sources épigraphiques," *Le Muséon*, LX (1947), pp. 78-80.

is only room for 3. The second would require the pronominal suffix after 'dd in its feminine form *syw* (see Jamme 343 A/2-3) and not the masculine *sww*.

ysrn: there is no doubt about the *y*, since the left half of its circle still remains and it breaks off at the top of the shaft; it is the name of the well. Besides the text mentioned in the preceding paragraph where *ysrn* designates a reservoir, two other Sabaean texts have *ysrn* as the name of an irrigated zone (see RÉS 2650/2 and 2651/2).

'dd: see RÉS 3610/7-8 where Jaussen and Savignac propose to translate by "help," CIH 540/45 "little camel," RÉS 4781/5 and Fakhry 71/8 by "harvest." None of these translations suit the present text. Biberstein-Kasimirski (II, 279 A) renders 'addw' as "enclosure around a water trough or along a road, masonry socle," etc. Lane (p. 2072 C) speaks first of all of an enclosure of a construction, irrigation canal, road, etc.; cf. *Muhiṭ el-Muhiṭ* (p. 1414 B) which says that the 'adād meant any construction which hides, encloses, or stops up a reservoir, a road, or any other work. 'dd may therefore be translated by "enclosure." *Rymt* and *r̄bt* are the two parts of the work 'dd; the first name is carved above the present text and the second is in Jamme 406.

Line 2-3. *bn/šrsm/’d/fr̄m:* Qatabanian expression (see RÉS 3552/3-4) meaning the whole construction from a vertical point of view. It is made up of two parts perfectly symmetrical both in the number of words, in the number of letters and also in mimilation. For the equivalent Sabaean formula, see the commentary on line 2 and the Minaean formula *bn/šrs/’d/šqrn* of RÉS 2929/3.

Line 3. Distance between the *d* of *fd* and the *n*: 26 cm., therefore 9 spaces. *Fd(f)[n]:* for the conjunction *f*, see M. Höfner.³ *D(f)[n]:* the lower quarter of the second letter makes the restoration of *f* necessary; the third letter can only be *g*, *d*, *l*, or *n*; the undamaged space at the left of the remaining fragment of stroke does not show any mark and its width is greater than the distance which separates the fragmentary stroke and the lower point of *f*. Consequently the lower

³ M. Höfner, *Altsüdarabische Grammatik* (Leipzig, 1943), p. 171.

part of the left stroke of a letter such as *b* should be seen. On the other hand, *h* or *ḥ* cannot possibly be inserted because they would be too close to the fragmentary stroke and to *f*. As to the Arabic root, *dfn*, see Lane (pp. 893 C and 894 A), Biberstein-Kasimirski (p. 714) and *Muhiṣ el-Muhiṣ* (pp. 223 and 224 A): "hide." After such a verb a preposition of distance such as *bn*, "from," may be supposed. The letter at the right of *n* before *hmqm* is *m*; the lower extremity of the oblique stroke forms a right angle as in the other *m*.

Hmqm: cf. the Arabic noun *hmd*, "evil" or "war" (Lane, p. 611 C).

Rqds: The verb *rqd* is often met with at the end of narrative and dedicatory inscriptions and means the act by which somebody gives into somebody else's charge, one or more divinities, an object, an animal, or a person. In our text, it is a well which is put under the protection of three divinities: 'Aqtar, the star-god⁴ and the moon-god, mentioned under the principal Qatabanian and Minaean names, 'Amm and Waddum.⁵ Instead of Waddum, we should expect to find the more regular insertion of a name of the sun-goddess.

Over the text, *rymt*; see the commentary on line 2.

Under the text, a monogram made up of all the elements which constitute *yd'b/dbyn/yhrgb*.

On either side of the text, a *ḥ* decorated with a little oblique line. The same two marks are found on the sides of other inscriptions from Wadi Beihān, e. g., W. B. 3/61 (=Groom-Beihan 34, see *Le Muséon*, LXIV (1951), p. 121). Thus we can draw the conclusion that these marks made up a decoration showing the boundaries of the inscription.

III. PALAEOGRAPHY AND IDENTIFICATION OF *SHR* (LINE 1)

The general palaeography of this inscription, to which should be added Jamme 406, belongs

⁴ A. Jamme, *op. cit.*, pp. 85-96.

⁵ A. Jamme, *op. cit.*, pp. 73-78.

to the archaic type of the phase following the boustrophedon period. The proportion between the length and breadth of the marks, the diameter of the circumferences as well as the important number of right angles certainly belong to the most ancient period. On the other hand, the slope of the median line of the *n* and of the upper part of the ' show a later period, as do the little rather primitive decorations placed at the ends of the strokes and also the curves of *h* and *ḥ*. The principal characteristic of the present script is the shape of *d*: the two component parts are clearly separated one from the other by a space up to 1 cm. wide. The palaeography of RÉS 4165 can quite rightly be considered as identical with the script of our text. The facsimile made by J. H. Mordtmann and E. Mittwoch showed the width of the letters by putting the outside edges in two concentric lines.

The palaeography of Jamme 405-406 takes us back to the late fifth or early fourth century B.C. Moreover, the enumeration *kl/wld/---/wtbnw* still to be found under Šahar Čaylān, is not found among the numerous texts belonging to the later period. All this can be readily explained by the identification of the king mentioned in this text with Yada'ab Dhubyān, son of Šahar, the author of numerous inscriptions, e. g., T.S.a of which the left part is RÉS 493.⁶

Jamme 406—Red granite stone still partly buried in the ground. W. B. 1/7.

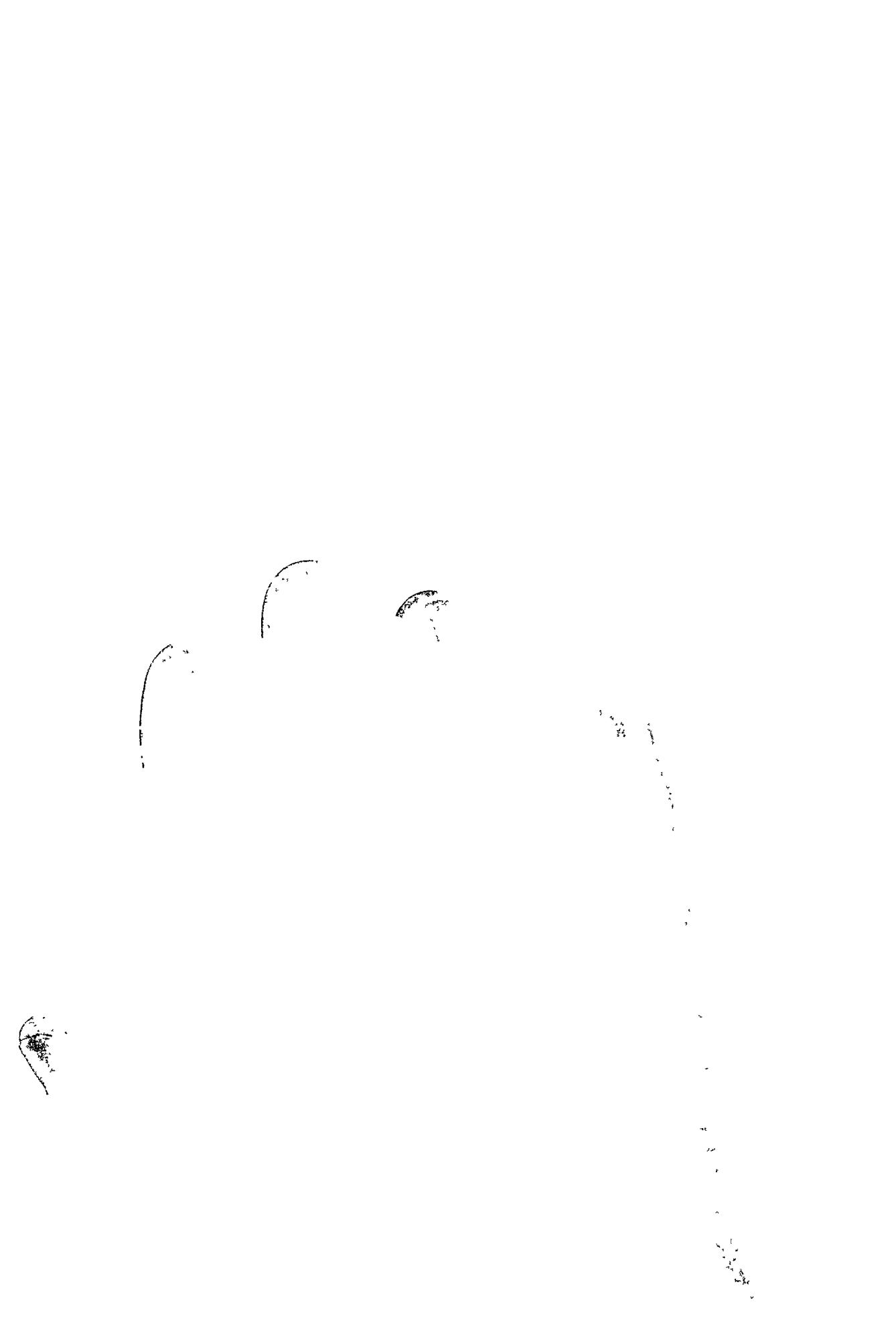
Top side: 88 × 46.5 cm., on which is found the inscription.

Inscription: 30 × 12.5 cm.; width of the *r* and the *b*, 4 cm.; of the *ḥ*, 5.2 cm., and the *t*, 4.5 cm.

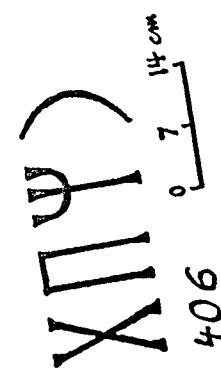
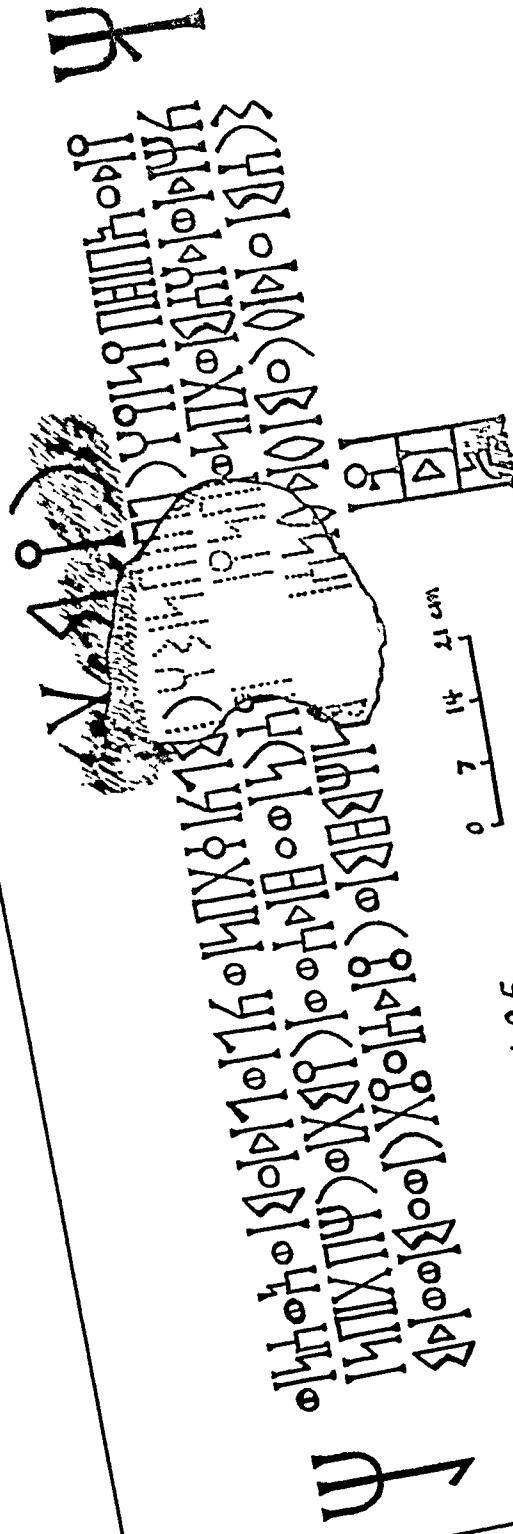
rhbt *Rahbat*

Rhbt, see Jamme 325 and commentary on Jamme 405, line 2.

⁶ A. Jamme, "A New Chronology of the Qatabanian Kingdom," *Bulletin of the American Schools of Oriental Research*, no. 120 (1950), p. 27.



to Part I



95. The She'b edh-Dhaqab inscriptions found on the right bank of the Wadi Murjâ'ah near Jebel Murjâ'ah.

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Appendix IV

DATING THE HUREIDHA IRRIGATION RUINS

Richard LeBaron Bowen, Jr.

Through the careful study of the artifacts recovered, Miss Caton Thompson was able to show that tombs A5 and A6, phases A and B of the temple, the "farmstead" (A4), and the ancient irrigation system at Hureidha were contemporary.¹ Whether the C and post-C phase of the temple, the tombs, and the irrigation system were also contemporary could not be established, owing to the fact that no sherds were found in this phase of the temple.² We are probably safe in assuming that the use of the irrigation installations continued through the C phase of the temple, since the C occupation followed phase B without interruption,³ and since the continuing use of the temple suggests, though does not definitely prove, that sedentary occupation (and probably agriculture) also persisted in the area. While the upper chronological limits of the tombs and of phases A and B of the temple were established by beads and seals exhibiting influence from datable foreign sources,⁴ the date of phase C and the final phase of the irrigation system rested solely on five uninscribed incense burners found in the C and post-C additions to the temple.⁵ Since a full treatment of South Arabian incense burners is planned for a later volume, we will limit ourselves here to the description of several of these burners and a few

observations which may be of value in the study of this material.

Miss Caton Thompson states that the dimensions of the Hureidha burners correspond to those of the four-legged series of inscribed burners from Yemen at the University of Pennsylvania and Harvard University.⁶ She further states that the Hureidha burners differed from any she could find in their zonal decoration of cross-hatching and in the reddening of the surface. Since the pair of burners at the University of Pennsylvania and the pair at Harvard University figure prominently in her study, they must be considered in greater detail. While photographs of these burners and discussions of their inscriptions have been published,⁷ they have not been properly described.

Although the photographs do not show it, one of the burners at Harvard and both of the burners at Pennsylvania show traces of artificial reddening on the sides and top edges. One of the burners at Pennsylvania and one at Harvard show light crosshatched lines on the bottom portions, as can be seen from the drawings (Plate 96). It should also be noted that the Yemen burners figured here are roughly square when viewed from the side (80 to 90 mm.). Only one of the Hureidha burners maintains these proportions (A3.20.B3). Three are taller, and one is shorter (A3.VI). In Beiḥān during the excava-

¹ G. Caton Thompson, *The Tombs and Moon Temple of Hureidha (Hadramaut)* (London, 1944), pp. 153, 143, 14 f.

² *Ibid.*, p. 59.

³ *Ibid.*, p. 58.

⁴ *Ibid.*, pp. 153, 94-103.

⁵ *Ibid.*, pp. 152 f.

⁶ *Ibid.*, pp. 49 f.

⁷ G. Ryckmans, "Inscriptions sud-arabes," *Le Muséon*, XLVIII (1935), pp. 163-187; A. Jamme, "Deux autels à encens de l'Université de Harvard," *Bibliotheca Orientalis*, x, 3-4 (1953), pp. 94-95.

tions of Timna', numerous incense burners were found. Most of these were squat (Plate 96), but some were tall and a few were square. This particular material from Timna' can be dated about the first century B.C. Among the incense burners found at the necropolis of Heid bin 'Aqil in Beihān were two small burners about 70 mm. square with inscriptions which A. Jamme dated to the boustrophedon period (fifth century B.C. or earlier).⁸

While the proportions of one of the Hureidha burners are similar to the dated material from Yemen (RÉS 4249, 4255; Jamme 384, 385) and Beihān (Jamme 370, 371), the exact type of crosshatching is apparently unique and may be a local development. Three of the Hureidha burners have two and three bands of crosshatching between double lines. Two of the Yemen burners (Jamme 385 and RÉS 4249) have crosshatching over the legs, while the squat Beihān burners usually have crosshatching completely covering the sides (Plate 96).

Lacking other comparative material, Miss Caton Thompson was forced to base the dating of the final phase of the Hureidha temple and the roughly contemporary irrigation ruins on a comparison of the uninscribed incense burners with similar material found in Palestine. She arrived at a date in the Seleucid period (third century B.C. or later).⁹ W. F. Albright has pointed out that the Palestinian burners date from the sixth (or late seventh century) to the fourth century B.C. and that therefore Miss Caton Thompson's date was too late by a century or two.¹⁰ Miss Caton Thompson has quoted the Gezer finds, but she was apparently unaware of the Gerar burners which are more closely related typologically and more exactly dated stratigraphically. A. Jamme originally suggested that the Harvard and Pennsylvania burners from South Arabia figured here could be dated palaeographically between the seventh and the third centuries B.C.,¹¹ but, in the light of our advanc-

⁸ A. Jamme, *Pièces épigraphiques de Heid bin 'Aqil* (Louvain, 1952), nos. 370-371, pp. 211 f. [Recent developments in palaeogeography indicate that these incense burners should be assigned to about the third-second centuries B.C.] —Editor.

⁹ G. Caton Thompson, *op. cit.*, pp. 152 f.

¹⁰ W. F. Albright, *Bulletin of the American Schools of Oriental Research*, no. 98 (1945), p. 28, and no. 132 (1953), p. 46.

¹¹ A. Jamme, "Deux autels à encens de l'Université de Harvard," *loc. cit.*

ing knowledge of palaeogeography, W. F. Albright dates the Pennsylvania burners between the third and the first centuries (probably in the second century), and the Harvard burners between the fourth and the first centuries (preferably in the third-second centuries B.C.).

There is little doubt that some of the square incense burners from Yemen and Beihān can be dated between the fourth and the second centuries B.C., so that Miss Caton Thompson's date in the third century for the Hureidha burners might seem acceptable. However, the Hureidha burners also share some typological features with the Beihān burners of about the first century B.C. In view of this new comparative material, the C and post-C phase at Hureidha, together with the associated irrigation works, probably belong between the third and the first centuries B.C., although caution must be used in attempting to date them more precisely at this stage of our knowledge.

DESCRIPTION OF THE BURNERS

*Peabody Museum, Harvard: 36-5-60/2492
(Jamme 384)*

Incense burner made of rather porous limestone. Length, 95 mm.; width, 89 mm.; height, 81 mm. The workmanship is rather poor. The corners are not very square, the dimensions are uneven, the hollowed-out spaces are very crude, and the designs are pecked into the sides rather crudely. The lower half of the corners of the feet on the front and back are cut off.

There is an inscription on one face only, which we shall call the front. The grooves of the lines composing the inscription are V-shaped. Above the inscription is a band of vertical incised lines about 8 mm. high and spaced about 10 mm. apart. Below the inscription is a wider band of 14 to 16 mm. composed of two rows of these vertical lines, each line being offset from the one below by half a space.

On the back there are four rectangles pecked out of the central portion of the face. Both

above and below the rectangles is a band of vertical lines identical to the one below the inscription found on the front. The left side is identical to the back, with four rectangles and bands of two rows of vertical lines above and below; the right side is similar to the left, except that there are five rectangles in the center. No lines were cut into the rim. There was no trace of artificial reddening.

It appears that the burner had been altered after the original design was incised on the sides; the space between the legs cuts into the lower band of vertical lines on all sides. On the front this space cuts into the lower row of lines so deeply that it is doubtful whether the short lines now showing could have been cut in the existing space.

*Peabody Museum, Harvard: 35-18-60, 2117
(Jamme 385)*

Incense burner made of limestone. Length and width, 82 mm.; height, 79 mm. Workmanship is excellent, the burner being almost perfectly square in plan. The corners are very sharp, and delicate ribs were left between each pair of legs.

There is a three-lettered inscription on each face. The letters are carefully incised and the grooves are V-shaped in section. At both ends of each inscription there are two vertical lines of the same height as the letters. These are pecked in roughly and are not cut V-shaped in section like the letters. Above the inscription is a band composed of a series of triangles about 7 mm. high, pecked out of the smooth surface; there are nine triangles to a side, on the average. Below the inscription is a narrower band composed of hollowed-out triangles only 5 mm. high; these number about 11 to the side. Below the lower band the legs are crosshatched with lightly incised lines 2 to 3 mm. apart.

There are three lightly incised lines cut lengthwise into the rim 3 to 4 mm. apart. Possible traces of red coloring appear on some sides and on the rim.

*RES 4219 (University Museum, Pennsylvania:
30-17-31)*

Incense burner made of limestone. Length and width, 80 mm.; height, 82 mm. Workmanship very similar to Jamme 385, from which it varies only a few mm. in size. It is perfectly square in plan, and has very sharp corners.

The design differs slightly, although this difference may have been unintentional, resulting from the design having first been laid out with rather deeply incised lines. Three inscription guide lines, above, below, and through the centers of the letters, are incised. A band of triangles similar to those found on Jamme 385 is spaced at a distance of 3 mm. above the inscription: 10 on two sides and 9 on each of the others. There are no triangles below the inscription, but there is a space of about 3 mm. between the lower inscription guide line and the one immediately below which marks the top of the legs. Below the bottom line is found the same crosshatching as in Jamme 385, except that it does not extend to each side.

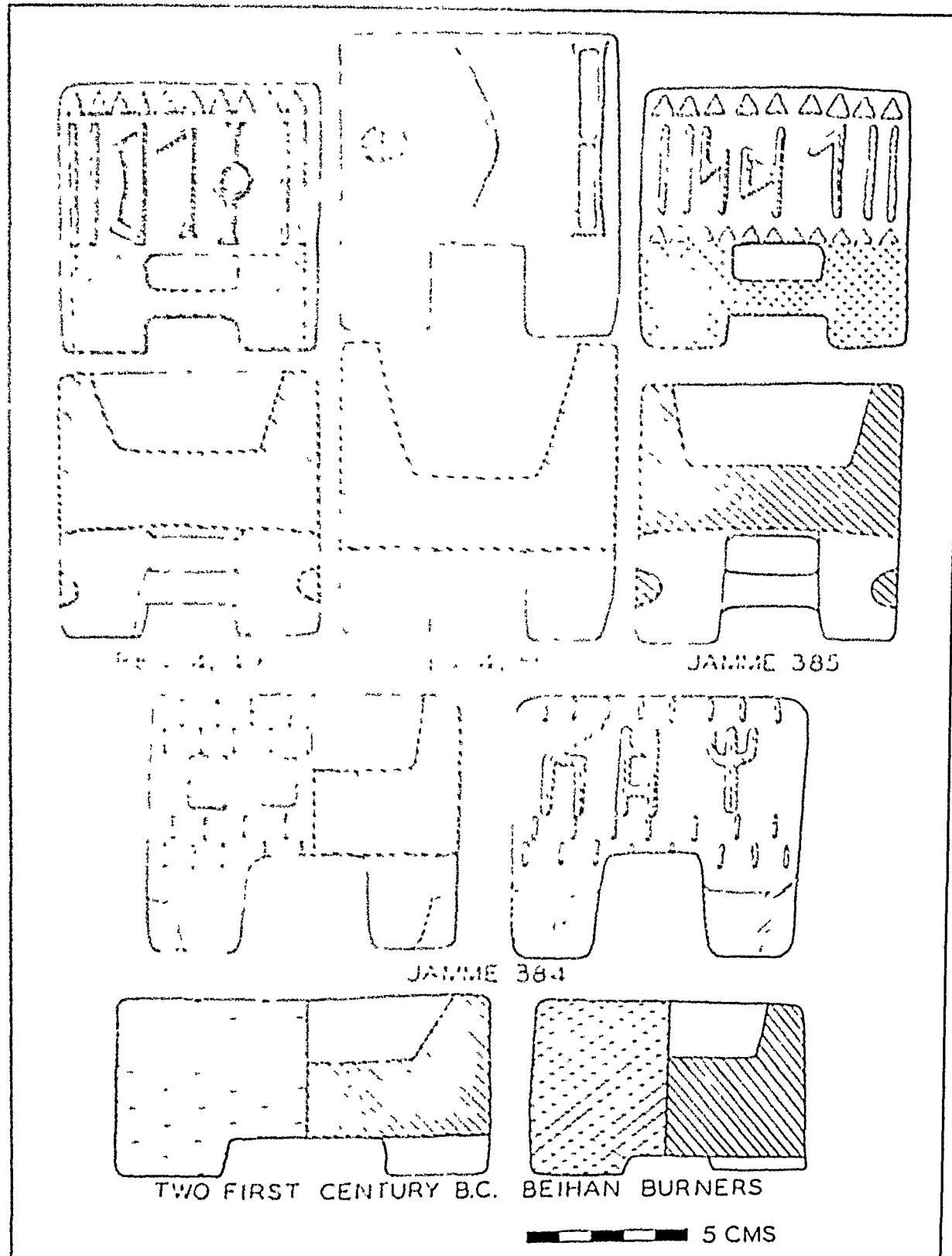
There are three lightly incised lines cut lengthwise into the rim 2-3 mm. apart, and there are also lines spaced at the same intervals cutting across these lines at right angles, so that the rim is crosshatched also. There are definite traces of red coloring in spots, and there is also a coating of indigo (or a dark blue substance of the same color) in the letters and other low places.

*RES 4255 (University Museum, Pennsylvania:
30-17-32)*

Incense burner made of fine limestone. Length, 87 mm.; width, 84 mm.; height, 90 to 92 mm. Workmanship very fine. Corners not very sharp, and dimensions vary slightly.

There is no design on the sides, other than an inscription which takes up most of the space. The only lines showing on the sides are just below the inscription and represent the lines by which the legs were laid out. The slenderness and delicateness of the letters are accentuated by the plainness of the faces.

There are no lines visible on the rims. There is evidence of a thick red coating in places.



96. South Arabian incense burners.

THE LION-RIDERS FROM TIMNA¹

Berta Segall

I

The two Hellenistic bronze groups of infant riders mounted on lions were found in the first campaign of the Timna² excavations at the foot of the south wall of a private house, House Yafash, facing the main gate of the city across a small square. Their South Arabian inscriptions, identical on both bases, are discussed by A. Jamme in the following pages. But much remains to be said about the groups themselves. They are of outstanding interest for the Arabist as well as for the classical archaeologist, and the survival of the motif into later periods also interests the historian of Islamic art. The following notes can only be the beginning of a discussion which will go on for some time to come.

The groups were broken in shipment to this country and not too carefully restored after their arrival. Further damage was done while the statues were on exhibition in this country, but this gave the restorer, Mr. Joseph Ternbach in New York, the opportunity to examine the groups, remove poor restorations, and replace them with carefully executed new ones that can easily be taken off, and the lions can now be examined more or less in their original state. The photographs on Plates 97 to 104 by Mr. Charles Weber were taken without restorations. These photographs and the valuable snapshots from the field taken shortly after the discovery of the groups, provide the basis for this discussion.

When I published the groups in a preliminary note in the *American Journal of Archaeology* in

1955,¹ I had to deal with them in their restored state, and Mr. Ternbach's subsequent work proved that my description was incorrect in several respects. New layers of plaster had been put on so thickly that some details had disappeared completely beneath it. Mr. Ternbach's report on his work follows. I will first quote the records of the excavation, then describe and analyze the statues, and finally attempt an interpretation of the motif.

The groups were found in the uppermost stratum of the excavation in the layer of ashes which marked the destruction of the city. The Arretine sherds which give a *post quem* date for the destruction of the city (see Howard Comfort's report) were found in the 1950 and 1951 campaigns beneath the layer of ashes. But that does not mean that the lions are later in date than the Arretine sherds. It simply means that the pots were broken and thrown out before or at the beginning of the final destruction and that the lions—a precious possession—had been well preserved and fell or were thrown into the burning debris from the house during the last stage of the conflagration.

The wall near which the groups were found is a plain wall without a door (Plate 105). The lions can therefore hardly have flanked an entrance of some kind as has been suggested.² The better preserved of the two groups facing left (Plates 97 to 100) was discovered first and then

¹ B. Segall, "Sculpture from Arabia Felix. The Hellenistic Period," *American Journal of Archaeology*, 59 (1955), pp. 210 ff.

² Charles Picard, "Les lions chevauchés de Timna et la sculpture alexandrine de l'Arabia Felix," *Revue Archéologique*, 6^e série, XLVI (1955), pp. 74 ff.

removed to the excavation house. It had been found slightly off center of the wall towards its east corner. The second was found later the same day, face down (Plate 106) and not over a meter away. Part of one of the front paws had been found previously in a trench dug at the east side of the same house in the street there. This was photographed and later fitted to the raised front leg of the second lion, found nearer the western corner of the house.

I quote A. M. Honeyman's description of the objects from the field catalogue:

S 152 a. Bronze relief by *cire perdu* of naked cupid mounted on a lion, facing left, holding a pointed lance in the right hand and in the left a chain around the lion's neck; total height 61 cm.

The lion advances on a bronze base 52 cm. long, 6.8 cm. wide, and 4.5 cm. high. The front of the base has a margin in relief 8 cm. broad and between, in relief, letters of 2.2 cm. height.

S 152 b. Second copy of the same, facing right; the tail and the left leg from the knee are lacking.

S 42. Foot and lower part of leg of bronze lion with one claw and plumage clearly represented. The horizontal projection by which it was fitted to some object is attached to it. Maximum length preserved about 10 cm.; max. width about 5.3 cm. Claw is 2.4 cm. long.

The photographs (Plates 107, 108) taken in the field immediately after the discovery of the objects supply the following information: The groups were found with the infants still attached to them. Both raised forepaws of the animals had been torn away and the infant of the eastern group, facing left, shows signs of ancient repairs on its left shoulder and perhaps also on its left thigh, though these may be scratches of the surface. Difficult to explain is the fact that this group is much better preserved than the other, whose surface is more incrusted, whose metal shows more signs of crystallization, and whose rider's right hand is cracked like most of the Timna' bronzes which had been subjected to the heat of burning debris.

The rear views (Plates 100, 104) taken in this country show how the hollow relief was fixed to a background by means of horizontal attachments in the shape of swallowtails, with central holes through which pins were passed and which today show only as depressions. According to

this evidence the thickness of the background was slightly less than one centimeter.

Mr. Ternbach's work of restoration had interesting results. His main task was to remove the new "plaster of Paris, reinforced with pieces of burlap and perforated steel sheets" (see his report), with which the objects had been filled solidly and which had been smeared along the lower outline of the right lion's body. These additions had been painted green to match the color of the original parts. Thus, the infants looked as if not only heads and limbs but also the bodies had been cast in the round and not hollow like the rest. Moreover, it was not apparent that both animals were meant to represent lionesses, since the teats of the right animal had been completely covered by a layer of plaster.

Even more important was the removal of the restoration of both raised forepaws. Thus the raised paw of the left lion, the one that had been found detached from the object in an adjacent street, could be studied for the first time in its original form and compared with the photograph taken in the field before it was fitted to the left lion. The photograph corresponds in all essentials to the outline of the paw as it is preserved today (Plate 109). In ancient times a rectangular piece had been cut out of the paw and the edges smoothed; the part underneath the only remaining claw, the one next to the background, had been extended into a hook, made to fit around the edge of some object now missing. It looks as if the missing object had been torn off forcibly, tearing the paw off with it. This object was then carried off through the street east of the house, where the paw was dropped.

We have, then, an antithetical bronze group of two lion-riders in high relief, formerly attached to a background. It seems probable that the groups once framed a central object which was torn off and carried away at the destruction. The lionesses are imaginary animals with the broad head and the luxuriant mane of the male lion, but with teats added to make them female. The infant boys, however, are as realistic as Hellenistic art could render them, with fat, dimpled knees and a baby's protruding stomach, with curly hair and ample cheeks in a round face. The faces are not entirely alike, however. The boy found nearer the eastern corner of the building has an open mouth with a fixed smile; the

mouth of the other infant is closed and he has a less smiling expression. The animals are modeled with the same care as the infants and with the same emphasis on detail. The right lion, which is better preserved, shows a rich play of muscles on the back and careful detailing of bones and sinews along the legs. The claws are modeled with equal care. Especially impressive are the animals' heads with heavy folds of flesh overhanging the eyes, with thick warts on the foreheads and with an open mouth from which protrudes a tongue once possibly overlaid with silver. The inscriptions are completely preserved and in perfect condition on both groups, in fact they are better preserved than the surface of animals and riders. According to W. F. Albright and A. Jamme the groups were cast in South Arabia about 75 to 50 b. c.

II

That the choice of the motif could not have been accidental is partly suggested by the inscription. It states that the statues were set up by two men, perhaps from the clan of the "craftsmen"^{2*} who also remodeled the House Yafash, and it follows that the groups were apparently meant to put the house, the men, and their work under the protection of their god. It is the nature of the god and the relationship of the twin riders to him that has to be determined.

Moreover, it is obvious from the inscription that the groups were cast in Arabia, but apparently from imported molds; though motif and execution are Greek, the interpretation must have been adapted to Arabian concepts. To interpret such a motif found in surroundings alien to the civilization in which it was originally created, one has to remember that works of art almost never illustrate myths and beliefs literally, but that they preserve—more faithfully than the written word—the underlying concepts from which they originally developed. One motif can

therefore illustrate a number of different myths which sprang from similar ideas, and its appearance long distances apart in various civilizations can furnish information about syncretistic trends about which little is otherwise known. It will appear that the Timna' riders illustrate syncretistic concepts which originated in the early Hellenistic period, but which became widespread only in the time of Shahr Yagil Yuhargib. The early first century b. c. saw an increase in syncretistic speculations all over the ancient world from its periphery in the West to its periphery in the Arabian South. Men and books traveled widely at this period, and for the first time Italian thinkers took part in the intellectual life of the Hellenistic world. On the other hand, while Greek thought and Greek myths penetrated into the remotest outposts, the Greek gods themselves were transformed and received in turn many features which originally did not belong to them. One of the most important of these foreign influences was the influx of oriental stellar beliefs; it is this aspect which was alone capable of connecting two worlds basically so alien in their mentality as the Greek and the Arabian.

Because so far no ancient Arabian religious texts have been recovered, little is known of the development of ancient Arabian religion; but it seems that Arabia succeeded in withstanding changes more stubbornly than other parts of the ancient world with similar beliefs, which is not surprising in view of its isolation. After the fall of the Neo-Babylonian Empire and increasingly after the Hellenistic period, a solar theology began to replace the lunar religion in many countries where it had formerly reigned, but the South Arabian moon-god remained supreme in his country and the sun-goddess and their son, the star-god, ranked apparently always below him. The best known and the most widespread symbol of this religion of sky-gods was the ancient Babylonian symbol of the sun-disk in the crescent of the moon, in other words, a combination of the sky of the day and the sky of the night, "the entire circle of heaven" as Herodotus calls it when speaking of the religion of the Persians (I, 131). In some cases the symbol is actually a complete circle with the swelling of the crescent added to its lower part.³

^{2*} Since the name of the clan, *Muhaṣni'um*, is the causative participle of the verb *sn'*, "to make, fashion (of a craftsman)," it is scarcely accidental that some of its members were craftsmen—Editor.

³ See also B. Segall, "Notes on the Iconography of

Outside Arabia, the rule of the gods of the nocturnal sky survived mainly in special, sometimes secret cults, in astrological speculations which began to contaminate even cults originally not connected with it, and in certain beliefs with respect to the Netherworld, in which the region of the moon played a most important part. These developments have in the last generation been clarified mainly by Franz Cumont and his followers; much of the following is based on the results of their work.

The motif of the lion-rider survived in Islamic art as an astrological illustration.⁴ One shows him wearing a rayed halo; he is thus definitely characterized as a stellar deity, in this case apparently the sun. But the lion-riders were created before the complete victory of solar theology. Though the lions are solar animals in astrological as well as in other astral beliefs, the Timna' groups must express a different thought. For their interpretation it must be kept in mind that the animals are lionesses, that the youthful riders are twins, and that the animals are here represented as subdued by means of chains and a staff with a sharp point. (The point was still attached to the staff when found, but has since been lost.) For all its Hellenistic charm the motif must reflect a serious struggle; through various foreign influences the supremacy of the moon-god does not seem to have gone entirely unchallenged at all times, and it looks as if the Timna' riders have a bearing on the dispute and on its outcome in South Arabia.

Originally the motif developed in Greek art from the representation of Dionysus riding on a panther and thus goes back to the end of the fifth or the fourth century B.C., which saw a revival of the Dionysiac religion on a large scale. But the composition of infants mounted on a variety of mythical animals is essentially a Hellenistic and more specifically an Alexandrian development. Ever since little children mounted on various animals rode in the Dionysiac procession of Ptolemy II in Alexandria as described by Callixenus of Rhodes (*Athenaeus v*, 200), such subjects were represented in Hellenistic and Roman art in Dionysiac contexts. And since in the same procession, as described by the same

Cosmic Kingship," *The Art Bulletin*, xxxviii, 2 (1956), pp. 75-80.

⁴ Franz Boll and Carl Bezold, *Sternglaube und Stern-deutung* (Leipzig, 1926), Pl. II, Fig. 3.

witness, there marched also three hundred Arab sheep and "camels, some of which carried three hundred pounds of frankincense, three hundred pounds of myrrh, and two hundred of saffron, cassia, cinnamon, orris and all other spices"—in short, the stock in trade of the Arabian merchant—Arabs must have been present and may have become acquainted with the motif for the first time at this period.⁵ But the Timna' groups cannot represent an independent South Arabian development. The motif is a new importation of the first century B.C. and reflects the syncretistic movements taking place at that time from Spain and Italy on the one hand to Arabia on the other.

The earliest and most complete composition of the type seems to be preserved on an ancient plaster cast from a silversmith's workshop in Memphis (Plate 112), at present in the Pelizaeus Museum in Hildesheim. Two youthful riders, here apparently girls, are mounted facing each other on Persian horned lions and flanking a winged divine child; the scene is displayed against the background of a rich floral ornament like that of the Siren on the wooden sarcophagus from Memphis in the Cairo Museum. Most likely both scenes are supposed to be located in some mythical beyond, and this is important, because it explains the later appearance of lion-rider terra cottas in Hellenistic and Roman graves. The ornament dates the plaster frieze at Hildesheim in the time of the first Ptolemy, and it is interesting to note that already at this time the divine child occupying the center of the composition is conceived as a true baby with a protruding stomach, with fat little legs, and apparently also with a round baby face though this is not too well preserved.

It is therefore all the more to be regretted that the contemporary or only slightly later colossal antithetical groups of children mounted on various animals which were discovered in the dromos of the Serapaeum in Memphis, are not better preserved. When Mariette first uncovered these limestone groups in the nineteenth century, enough was apparently preserved to give an idea of the type of child repeated on all the groups.

⁵ Compare also the "Minaean frankincense" in Egypt in the reign of Ptolemy II. See W. W. Tarn, *Journal of Egyptian Archaeology*, 15 (1929), p. 20 and note 9; also the Arabian bodyguard of Ptolemy III in the Fayum. *Ibid.*, p. 21 and note 3.

When they were recently re-excavated, all the figures of children were found damaged; no face was preserved. Nevertheless, the splendid publication with new photographs which J. Lauer and Charles Picard^b have devoted to the site and the sculpture gives for the first time an opportunity to compare in detail the groups from the Serapaeum with similar representations elsewhere and especially with the Timna^c groups.

Some similarities between the feline animals in Memphis and in Timna^c are striking; the low base on which the animal stands, the care for anatomical detail such as muscles, sinews, and protruding bones, the detailed modeling of the sharp claws of the lion and even, in the case of the cerberus (Lauer-Picard, Fig. 131), the protruding tongue. However, there are no exact analogies; the Timna^c animals belong to another style, and the type of child must have been quite different, a boy six years of age or even older. The most interesting is the largest of the statues, which Mariette thought to be the center of the entire composition. (This has been doubted by Lauer, and Ch. Picard considers the animal to be a female panther, which is doubtful in view of the fact that in Roman times lionesses seem to have been preferred for this representation. See below.) "Une lionne de proportions colossales," says Mariette, "montée par un génie sous forme d'enfant, occupe le milieu. A droite et à gauche sont des paons, également de proportions colossales, et également tenus en bride par un enfant." (Quoted from Lauer-Picard, pp. 184 ff.) Picard adds (p. 192): "Les petits cercles qu'on voit près de la mâchoire et sous l'oreille (of the lioness) répondent sans doute à des anneaux métalliques faisant parti du harnachement." We have, then, the perfect early Alexandrian prototype to the Timna^c groups, a lioness chained and tamed by a small boy. The surprising feature is his costume. The boy, mounted in turn on a peacock, a cerberus, and a lioness, wears the costume of Attis.

Early Alexandrian poetry knew, of course, the Phrygian shepherd, and if Catullus reflects Callimachus, it even knew him vaguely not only as a friend but also as an adversary of the lions of Cybele; in Catullus' poem Cybele sends her lions

^a J. Lauer and Charles Picard, *Les statues Ptolémaïques du Sarapeion de Memphis*, Publications de l'Institut d'Art et d'Archéologie de l'Université de Paris, III (Paris, 1955).

after Attis to punish him.⁷ This version reflects a non-Greek strain of the myth and is otherwise rarely mentioned in literature. The Greek anthology (VI, 220) tells of the victory of Attis over a lion who had followed him into a cave, and the Emperor Julian asserts in his "Hymn to the Mother of the Gods" (168) that it is Attis who rules the lions. Otherwise, it is usually Cybele who dominates the lions (and who dominates Attis) in the literary Greek tradition. But in the Alexandrian cult, as we see it reflected in the Serapaeum sculpture, Attis has clearly overcome the animals on which he rides. How can this rare version of the Attis myth be explained? When Attis is represented in art in the traditional way as the follower of Cybele, both he and the goddess are carried by the lion as a friendly animal. This traditional version was known in early Alexandrian sculpture as well. The early Hellenistic find of small bronzes from Galyub in Egypt,⁸ which preserves copies of large Alexandrian sculpture on a miniature scale, has two figures of Cybele and one of Attis as lion-riders which are rendered in this peaceful way (Plate 110). What led to the different version of Attis as tamer of the lion or lioness is his association with astral myths and his occasional identification with the moon-god, Men. Representations in art of this version are very rare. One occurs on a silver plate from the early Roman silver hoard found in Hildesheim (Plate 111) which belongs to the few Hellenistic pieces of the hoard which were very likely manufactured in Alexandria. The silver relief shows the bust of the adolescent Attis as sky-god; his Phrygian cap is adorned with stars, and behind his shoulders appears a large crescent. Only in his quality as a lunar deity can the presence of Attis among the Serapaeum sculpture be explained, and only in this way could his assimilation to Osiris-Sarapis be understood and accepted by the masses, because Osiris himself was the moon, the subterranean sun of the night. Already in an Osiris hymn of Ramesses IV it is said: "Lo, thou art the moon on high, thou becomest young at will and agest at will." And a Ptolemaic in-

⁷ Hugo Hepding, *Attis, seine Mythen und sein Kult*, Religionsgeschichtlichen Versuche und Vorarbeiten I (Giessen, 1903), pp. 15, 141.

⁸ Albert Ippel, *Der Bronzefund von Galjub* (Berlin, 1922), Pl. I, nos. 1, 2, 6. E. Pernice and F. Winter, *Der Hildesheimer Silberfund* (Berlin, 1901), Pl. V, text p. 28.

scription of the temple of Denderah states: "Osiris awakes from sleep (of death) and he flies like the *benu* bird, and he makes his place in the sky as the moon."⁹

The last link in this chain and its unequivocal confirmation comes from the engraved design of a lion-rider on a magical gem in the Metropolitan Museum in New York.¹⁰ Here, the lion is characterized as a solar animal by a large rayed halo around his head, and the adolescent rider carries the flail of Osiris. Centuries separate the Serapaeum group from the magical gem in the Metropolitan Museum, but symbolism and representation are almost unaltered. The main difference is the size of the young rider; on the gem he is much larger in proportion to the animal and clearly dominates it. It is known that Arabian traders were accepted among the foreign priests of the Egyptian Serapis temples as early as the time of the first Ptolemies. The syncretistic links between the Arabian and Ptolemaic religious concepts are therefore of long standing and must have been officially fostered by both sides.¹¹

Perhaps Attis appears as a child and not in his usual form as an adolescent in the Serapaeum sculpture because the moon "becomes young at will and ages at will" as the Egyptian hymn says and apparently also because the fact had to be impressed on the pious that a mere child could overcome the ferocious animal sacred to the sun. The latter point seems to have been especially emphasized as time went on, and in the first century B.C., when Roman thinkers first became acquainted with the Hellenistic myth, their contribution seems to have been both to define it more sharply and to exaggerate it. It is in this exaggerated form that we first hear of it from the Western periphery of the ancient world. Pliny reports that there was, in the collection of Varro, a famous marble group by the sculptor Arcesilaus, of cupids playing with a lioness (Pliny *Nat. Hist.* 36:41), some holding her by a cord, some forcing her to drink from a horn, and some mocking her terrible claws by putting shoes on them. Pliny took over the description from Varro's own writings, and since

the group has not survived, one cannot decide what was actually represented and what was literary embellishment. But the literary embroidery is also interesting because it adds to the information about Varro's thought and especially about his sources. Varro must have borrowed the idea from some center of the Hellenistic East, and very possibly from Alexandria.

The most interesting point of Pliny's description is the part about the drinking horn: the divine children force the lioness to drink the wine of Dionysus. They belong therefore certainly to his entourage, and the group by Arcesilaus is thereby closely linked to the groups from the Serapaeum in Memphis, not only because of the identification of Dionysus, Osiris, and Attis, but also because the Memphis sculptor took care to stress the Dionysiac context by adding numerous large clusters of grapes to all the statues. The Dionysiac context is always emphasized in representations of the motif in the Roman period. Part of Arcesilaus' strange composition actually survived on Roman mosaics. Three of them have already been connected with the Arcesilaus group.¹² But another one has gone unrecognized, and this is the most remarkable of all, because it combines the scene of the humiliation of the lioness as described by Varro with the motif of the antithetical lion-rider groups from Timna¹³.

The mosaic (Plate 113) was found near St. Leu in Algeria, the ancient Portus Magnus, and is now in the Museum of Oran. It is part of a larger mosaic from a Roman villa, apparently covering the floor of its anteroom.¹⁴ The house must have been the meeting place of a Roman *Kultgenossenschaft*, with the main room serving for ritual banquets; the decoration of the anteroom apparently symbolized an initiation. The large central mosaic of the anteroom is characterized as a representation from the Dionysiac cycle by a satyr who occupies the center of the scene. In the foreground two boys are busy harnessing a lioness who submits quite stoically. One of the boys is straddling her back; the other stands before her, holding a rope, which he

⁹ H. Frankfort, *Kingship and the Gods* (Chicago, 1948), pp. 145, 195 f.

¹⁰ Campbell Bonner, *Studies in Magical Amulets* (Ann Arbor, 1950), no. 211, Pl. 10.

¹¹ N. Rhodokanakis, "Die Sarkophaginschrift von Gizeh," *Zeitschrift für Semitistik*, II (1923). See especially "Ein Südaraber als ägyptischer Priester," pp. 116 ff.

¹² Dominique Costa, "Dionysos enfant, les Bacchoi et les lions," *Revue Archéologique*, XXXIX (1952), pp. 170 ff.

¹³ C. Robert, "Das Mosaik von Portus Magnus," *Jahrbuch des Deutschen Archäologischen Instituts*, V (1890), pp. 215 ff. P. Gauckler, *Inventaire des Mosaiques de la Gaule et de l'Afrique*, III, Algérie (Paris, 1925), Pl. 454 (St. Leu).

passes on to his mate. The upper and lower border of the panel are both decorated with the antithetical groups of the lion-riders. In the lower border, facing the entering worshipper first, the boys riding the lions are not winged, in the upper borders they have received wings. Both groups flank an enormous kantharos from which sprouts a large floral motif.

Whatever the bridling of the lioness meant in this particular context, it is made clear by the two pairs of lion-riders that the scene separates a scene of striving for and a scene of attainment of a specific kind of salvation or of bliss symbolized by the winged twins in the upper border. For the Timna^a groups it tells us very little. For these the lion-rider panels alone are important, because the central motif of the Dionysiac kantharos is further proof, if proof were needed, that the twin lion-riders are acolytes of Dionysus, who, in Timna^a, would be a Dionysus in Arabian guise.

Shahr Yagil Yuhargib's contemporary Cicero wrote:

Dionysos multos habemus: primum Iove et Proserpina natum; secundum Nilo, qui Nysam dicitur interemisse; tertium Cabiro patre, eumque regem Asiae praefuisse dicunt, cui Sabazia sunt instituta. Quartum Iove et Luna, cui sacra Orphica putantur confici. Quintum Niso natum et Thyone, a quo Trieterides constituae putantur. [De natura deorum III, xxiii, 58].

Of all the different deities who had been fused in the Dionysiac cycle, Sabazios is the only one about whose qualities as a sky-god and especially as a lunar deity we are certain. He is the *rex Asiae* par excellence; through him the myths and images of the old Near Eastern lord of the sky reached Hellenistic and Roman mythology and art. On late Roman magical gems it is his name that is inscribed on stones with the lion-rider: Iao Sabao Domnos (dominus). And it is he who is represented in art not only surrounded by astral symbols, but also flanked by twin riders, the Greek Dioskouroi (Plate 114).¹⁴

The bronze plaque in Plate 114 was discovered in an early Imperial grave in Spain. The central plaque shows Sabazios as lord of the skies with the symbol of the sun resting in the crescent of the moon. He is flanked by the Dioskouroi

characterized as the morning and the evening star that appears over their heads. Spanish art was always under strong Eastern influence, and it is therefore not surprising that it preserved the character of the *rex Asiae* more clearly than countries under more immediate Greek influence, where the moon is a goddess and where it is more often a female divine figure that appears between the twins. A statuette of Sabazios, characterized as moon-god by the crescent wings that appear usually on representations of Men, was actually found in Timna^a (Plate 115).¹⁵ The statuette is an import from a Hellenistic city, but its presence in Timna^a proves that the Arabs were acquainted with the god's connections with the stellar myths. It cannot have been unique in Timna^a, and it is tempting to suppose that his figure, an altar dedicated to him, or some other symbol that denoted his presence, formed the center of the Timna^a groups. However, this problem will never be satisfactorily solved, and the question remains, whether the twin lion-riders from Timna^a can in any way be connected with the Greek Dioskouroi.

The Greek Dioskouroi form part of a large group of twin divinities belonging to many civilizations which have once been called "dioskurenartige Götter."¹⁶ They are rarely identical twins; in most cases they are shown with slight differences and their myths prove that they represent those opposites which are common to all ancient religions: in astral beliefs they are night and day or morning and evening, in eschatological thought they stand for life and death, in astrological speculations they may be winter and summer. Most of the pertinent information concerning the Greek Dioskouroi as opposites was gathered by A. B. Cook in the second volume of his *Zeus*.¹⁷ It appears that the myth was fully developed in the first half of the fifth century b.c. Pindar writes (Cook, p. 437): "In alternate changes the twin brethren

¹⁴ B. Segall, "Sculpture from Arabia Felix. The Hellenistic Period," *American Journal of Archaeology*, 59 (1955), pp. 212 ff. and Pl. 58.

¹⁵ Friedrich Marx, "Dioskurenartige Gottheiten," *Mittheilungen des Deutschen Archäologischen Institutes in Athen*, 10 (1885), pp. 81 ff. S. Eitrem, "Die göttlichen Zwillinge bei den Griechen," *Skrifter udgivne af Videnskabselskabet i Christiania* 1902. II Historisk-filos. Klasse. No. 2. Ditlef Nielsen, "Ras Samra Mythologie und Biblische Theologie," *Abhandlungen für die Kunde des Morgenlandes*, XXI, 4 (Leipzig, 1936), pp. 37 ff., 59.

¹⁶ A. B. Cook, *Zeus*, II, I (Cambridge, 1925), pp. 432 ff.

¹⁷ Martin Almagro, *Las Necrópolis de Ampurias*, II (Barcelona, 1955), pp. 126 ff., Fig. 109 and Pl. xi.

spend the one day beside their father Zeus and the other down in the hollow earth. . . ." In keeping with the development of Hellenistic religion in general, this myth had acquired astral connotations by the late Hellenistic period. Philo says in his treatise *On the Decalogue 12* (iv, 258, Richter) about the mythologists: "They bisected the sky theoretically into hemispheres, one above, the other below the earth and called them Dioskouroi, adding a marvelous tale about their life on alternate days." (Translation by Cook, *loc. cit.*, p. 433.)

The version of the myths of the twin gods as representatives of the sky of the day and the sky of the night became very popular in the Roman period.¹⁸ In Arabia it was this version that made their myth acceptable as a basis for syncretistic fusion with Arabian concepts, and on this basis other analogies could be developed. In the Imperial period the twin gods were protectors of the caravan trade in North Arabia, as they were protectors of travel by land and by sea in Greece.¹⁹ Especially interesting in this connection is a small circular lead plaque from Palmyra published by Rostovtzeff. The disk is fashioned so as to represent the old sun-moon symbol by adding the swelling of the crescent in relief to its lower part. In the crescent, and below the sun disk, are the busts of the two youthful twin gods; on the obverse of the plaque is a laden camel.²⁰

If one remembers that the House Yafash, to which the twin riders of Timna²¹ belonged, was situated immediately opposite the entrance gate of the city, the function of twin gods as protectors of travel and trade becomes significant. But the analogies between the Greek and the Arabian twin gods apparently do not end there. Even more interesting is the function of the Greek Dioskouroi as protectors of houses.²² In Greece, the Dioskouroi were often worshipped in domestic cults. On Italian soil they were actually confused with the Lares.²³ Chapouthier has

¹⁸ Franz Cumont, *Recherches sur le symbolisme funéraire des Romains* (Paris, 1942), especially "Les Dioscures symboles des hémisphères," pp. 64 ff.

¹⁹ M. I. Rostovtzeff, "The Caravan Gods of Palmyra," *Journal of Roman Studies*, xxii (1932), pp. 107 ff.

²⁰ *Ibid.*, Pl. 28, no. 8.

²¹ Fernand Chapouthier, *Les Dioscures au service d'une déesse* (Paris, 1935), "Les Dioscures au service de la maison," pp. 313 ff.

²² *Ibid.*, Figs. 63-66.

pointed out that this function must stem from the fact that they were sometimes thought of as children, and that children were considered to be protectors of domestic thresholds and of city walls.²³ Finally, in some of their myths, as Daktylooi, the twin gods were protectors of smithies and forges.²⁴

The heavenly twins of the Hellenistic world possessed, then, many characteristics which could apply to the twin riders from Timna²⁵: These, too, were meant to protect the house that is prominently mentioned in the inscription on their base, its owners who probably belonged to the clan of craftsmen and the travelers which it very likely received. Moreover, the Hellenistic analogies suggest that the infant twin gods functioned here in the service of the highest of the Arabian sky-gods, the moon, and that they are represented as having subjugated the lionesses of the sun-goddess. Under the influence of Alexandrian thought and Alexandrian art the lion-fighting gods of old had become lion-taming divine children.

I suggested at the beginning of this study (p. 158) that the motif of lion-taming infants may reflect a struggle for supremacy of the moon-god over the sun-goddess. This could only have occurred as a result of influences from abroad which must have made themselves increasingly felt with the growth of Arabian trade with Hellenistic cities. All that we know about the Arabs from non-Arabian sources of the Hellenistic period points to the fact that their trade was extensive and that therefore the number of Arabian merchants who knew the Hellenistic world from repeated and prolonged stays abroad must have been considerable. We have Minaean inscriptions from Memphis and Delos, etc., we have, among other things, evidence for the manufacture of perfume on a large scale in cities like Alexandria, a product which depended to a great extent on Arabian raw materials, and we have the explicit statement by Strabo that camel traders traveled back and forth over the incense road "in such numbers of men and camels that they differed in no respect from an army." (*The Geography of Strabo* 16. 4. 23. Translation, Loeb Classical Library.) Such repeated and prolonged

²³ *Ibid.*, p. 314, notes 2, 3.

²⁴ Daktylooi twingods: Bengt Hemberg, *Die Kabiren* (Uppsala, 1950), pp. 346 ff. and especially p. 347, no. 5; p. 348, no. 29. Chapouthier, *loc. cit.*, p. 173.

contact invariably led to an exchange of ideas. There is nothing in ancient South Arabian civilization as we know it today to suggest that the Arabs of that time were less intelligent or less literate than the Arabs of later periods. On the contrary, from their achievements in engineering and architecture and especially from the profusion of inscriptions in their country we must conclude that they were highly civilized and therefore must have been acquainted with many of the ideas outside their own world. What they used of this knowledge and what they rejected is a fascinating, though difficult, field of investigation.

Outside Arabia in the Hellenistic world the trends of intellectual life in the first half of the first century B. C. pointed toward unification and systematization of the immense store of knowledge collected since the beginning of the Hellenistic period, as illustrated for instance by the work of the Syrian philosopher, Posidonius. New scientific insights along with eastern and western myths and beliefs of the past were incorporated into large cosmological and physiographic systems. In stellar beliefs the supremacy of the sun over the moon had long been established under Greek influence, but the grandiose solar theology which was to dominate the entire Roman period began to receive its large-scale systematic structure only at this time. For Cicero "the sun is the chief of all celestial bodies" (*De natura deorum* II, 19). "The sun has the place in the midst, leader, king and ruler of the other heavenly lights, the reason and the order of the universe." (*Somnium Scipionis*, 4.)²⁵ This is in direct contrast to everything that we know of the thought of early Arabia and it is therefore most surprising to find of all countries, Arabia Felix, the fabulous but largely inaccessible land with all its unknown but vividly imagined marvels, used as a prime illustration for the creative powers of the sun. Diodorus Siculus says (II, 51 f.):

For it would seem that the land which lies to the south (Arabia Felix) breathes in a great deal of the sun's strength, which is the greatest source of life, and that, for that reason, it generates breeds of beautiful animals in great

numbers and of varied colour. . . . In these countries are generated . . . also outcroppings of every kind of precious stone which are unusual in colour and resplendent in brilliancy. For the rock-crystals, so we are informed, are composed of pure water which has been hardened, not by the action of cold, but by the influence of a divine fire. . . . And it is generally true that of the differences in the hues of flowers and of the varied colours of the earth the sun is the cause and creator. . . . Consequently, neither the white marble of Paros nor any other stone which men admire can be compared with the precious stones of Arabia, since their whiteness is most brilliant, their weight the heaviest, and their smoothness leaves no room for other stones to surpass them. And the cause of the peculiar nature of the several parts of the country is, as I have said, the influence of the sun, which has hardened it by its heat, compressed it by its dryness, and made it resplendent by its light." [Translation, C. H. Oldfather, Loeb Classical Library.]

These speculations about the surpassing power and creative force of the sun cannot have gone unnoticed in South Arabia and must in some way have influenced the cult of the sun goddess. Women especially seem to have put themselves under her protection, if one can judge from the inscription on the base of the portrait of one of the great ladies of Timna', Lady Bar'at. In this inscription, the goddess is invoked in a double capacity which A. Jamme interprets as the winter- and the summer-sun. (See the following article.) That the two lionesses from House Yafash with infant riders represent this particular pair of opposites cannot be proved. From all analogies referred to above it has become clear that not the lionesses, but the riders and the fact that they have chained and subjugated the animals, is the important factor for their interpretation. Moreover, the groups of the Timna' riders were dedicated by men and apparently by men of the ruling class. That they should have selected for one of the most important pieces of sculpture in their patrician house and for an important occasion (A. Jamme has suggested the occasion of the rebuilding of the house) a motif which, outside Arabia, indicates a supremacy of the divinity of the night-sky over that of the sky of the day, is possibly a sign that they meant to emphasize their special loyalty to the Arabian male god of the heavens. In Babylon the moon-god had from very ancient times "renewed the

²⁵ Martin P. Nilsson, "The Rise of Astrology in the Hellenistic Age," *Meddelande från Lunds Astronomiska Observatorium*. Ser. II, no. 111. Historical Notes and Papers, 18 (Lund, 1943), p. 6.

royal seed to distant days" ²⁶ and was therefore the divinity of rulers and the ruling class and, in a wider sense, the "life-index," the index to health and prosperity, of the ruled, as W. F. Albright suggested. This is as far as we can go at present in the interpretation of the motif.

III

Contemporary Roman thinkers were strongly influenced by the Greek point of view, and it would be interesting to know whether Varro's marble group by Arcesilaus representing the harnessing of a lioness by infant followers of Dionysus was taken seriously by him or was meant to be a satire on some obscure trend of thought. The group and the rest of the work of Arcesilaus are at any rate an important contemporary Western parallel to the Timna' lions. What Pliny tells about him is apparently taken from Varro's own writings, and it is interesting that a great deal is made of the fact that Arcesilaus made clay models (*proplasmata*) and plaster models from which other artists worked. "For his clay models," says Pliny (*Nat. Hist.* 35:155), "artists would pay more than was given for the finished work of others. . . . He also made a plaster model (*exemplar e gypso*) from which a Roman knight had a krater made."

This tradition on the workshop practices of Greek artists working at the periphery of the

²⁶ W. F. Albright, "Gilgames and Engidu, Mesopotamian Genii of Fecundity," *Journal of the American Oriental Society* 40 (1920), pp. 333 ff.

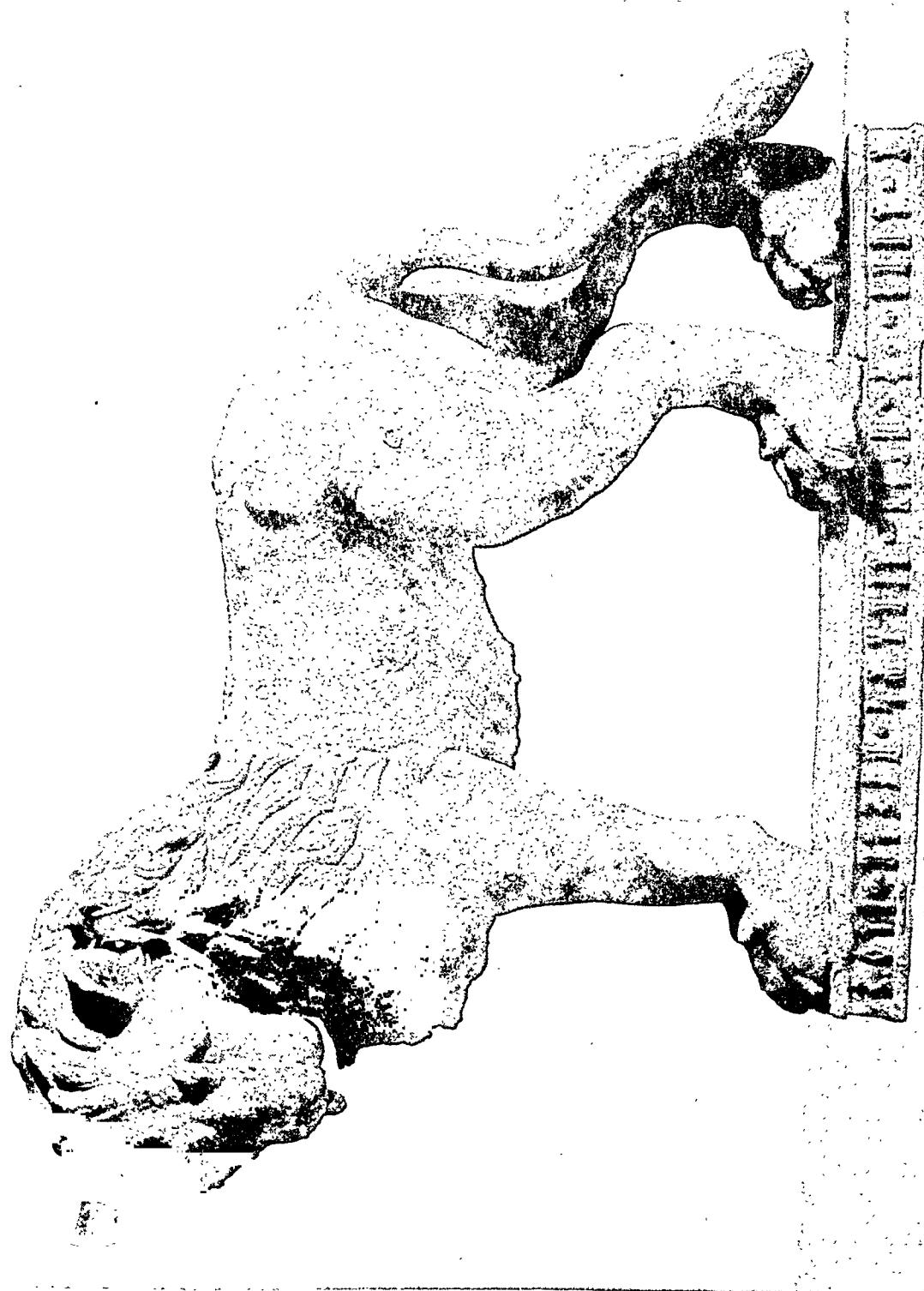
ancient world helps to explain the appearance of the lion-riders in Timna': models in some inferior material or plaster molds were an important sideline and a good source of income for a great many Hellenistic artists. The early Hellenistic workshop in Memphis, which yielded many plaster models and from which our Plate 112 is taken, is well known. Lately, an emporium which contained an entire shipment of such plaster models of the late Hellenistic and early Roman period was discovered in India.²⁷ These can come from no other place than Alexandria. Stylistically, iconographically, and in point of view of technique, they are the direct continuation of the plaster models from the early Hellenistic workshops discovered in Memphis.²⁸ We have then every reason to expect that plaster models or molds also reached Arabia, and some may be discovered one day. The statuette of the bearded, winged god of Sabazios-type (Plate 115) is certainly an import from a Hellenistic city²⁹ and proves again that from the earliest period of ancient South Arabian civilization, when a queen from Saba' was supposed to have admired (and perhaps later copied) "the house that Solomon built,"³⁰ the Arabs lost nothing of their admiration for foreign works of art.

²⁷ J. Hackin, *Nouvelles recherches archéologiques à Begram*, Mémoires de la délégation archéologique Française en Afghanistan, xi (Paris, 1954).

²⁸ In the summer of 1955 I studied both the early Hellenistic plaster models from Memphis in the Pelizaeus Museum in Hildesheim and the plaster models from Begram in the Musée Guimet in Paris under a grant of the Penrose Fund of the American Philosophical Society.

²⁹ B. Segall, "Sculpture from Arabia Felix. The Hellenistic Period," *American Journal of Archaeology*, 59 (1955), pp. 211 ff.

³⁰ See my forthcoming paper in *Ars Orientalis* II. Also B. Segall, "Problems of Copy and Adaptation in the Second Quarter of the First Millennium, B.C.," *American Journal of Archaeology*, 60 (1956), pp. 165 ff.



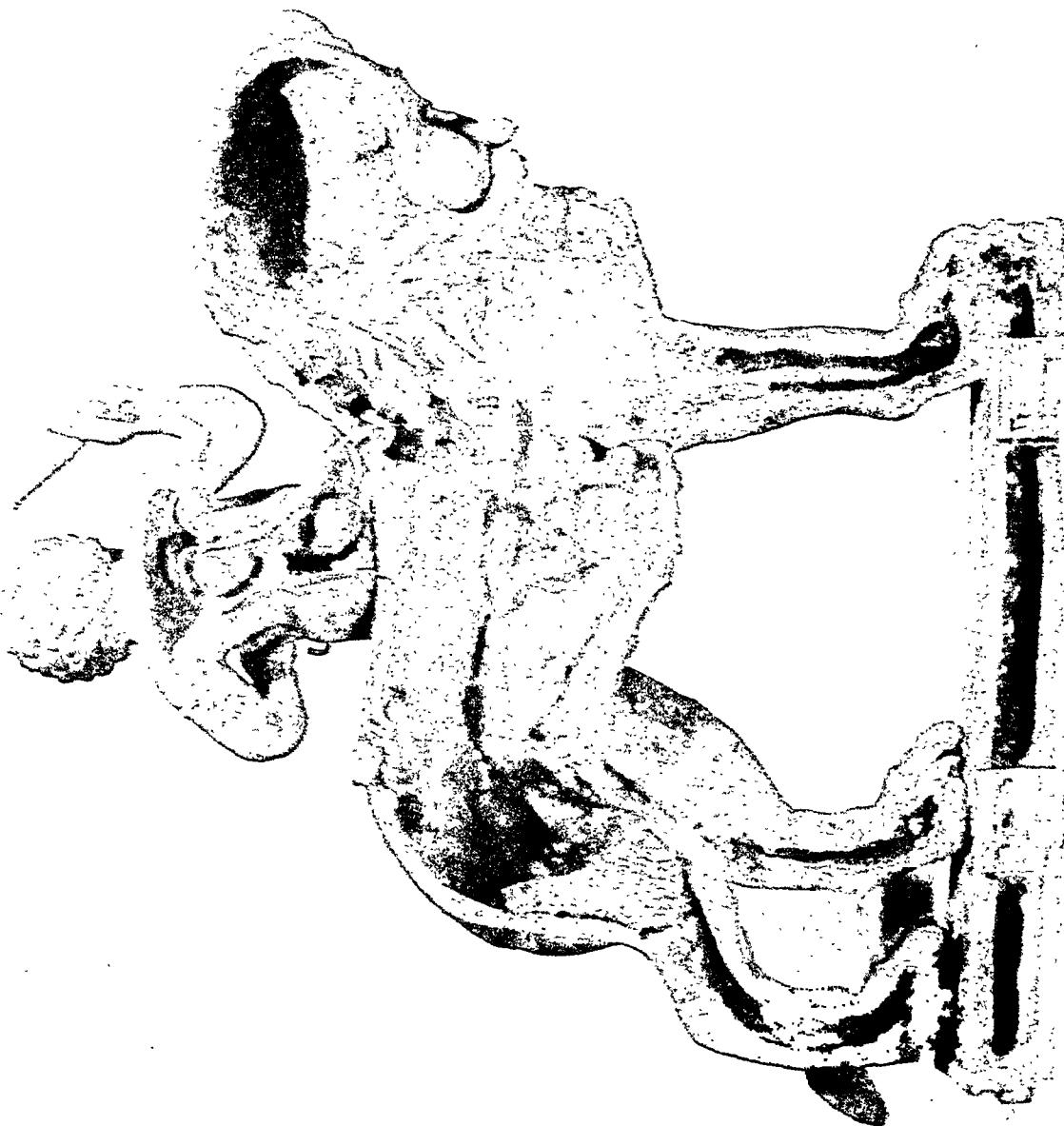
97. Right lion (S 152 a) from Timna.



98. Right lion from Timna.



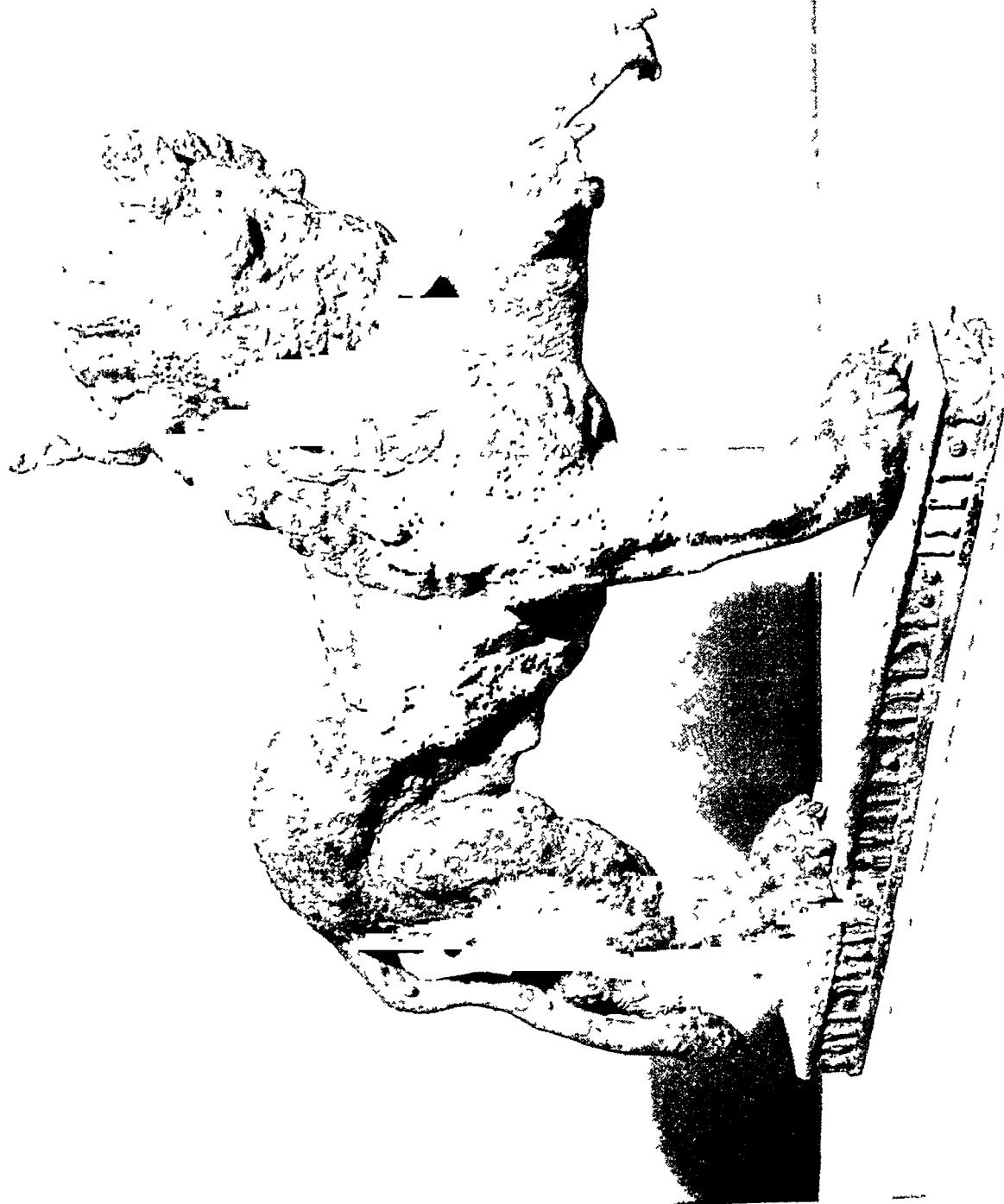
Right lion with infant rider
33



100. Rear view of right lion with infant rider.



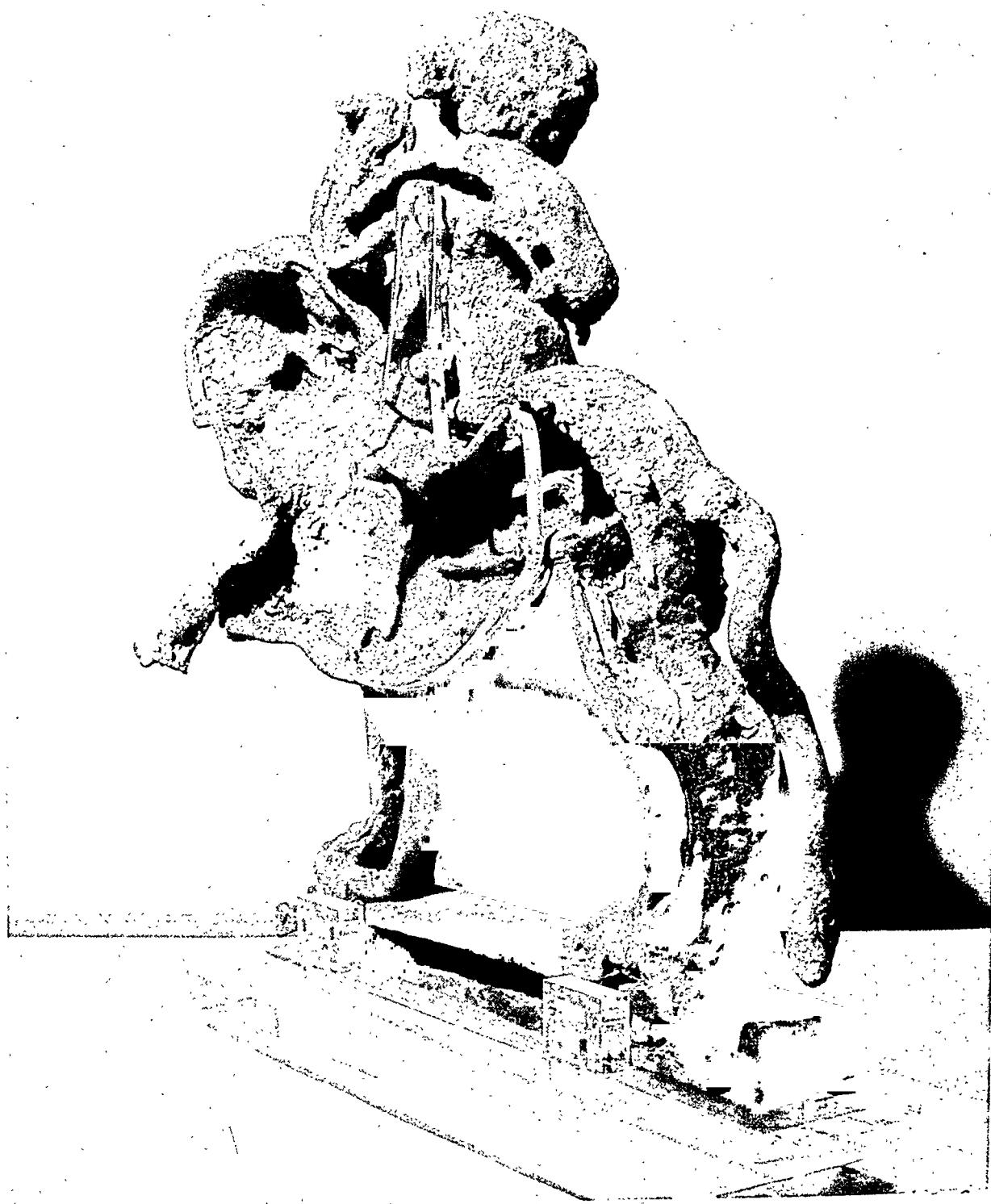
101. Left lion (S 152 b) from Timna.



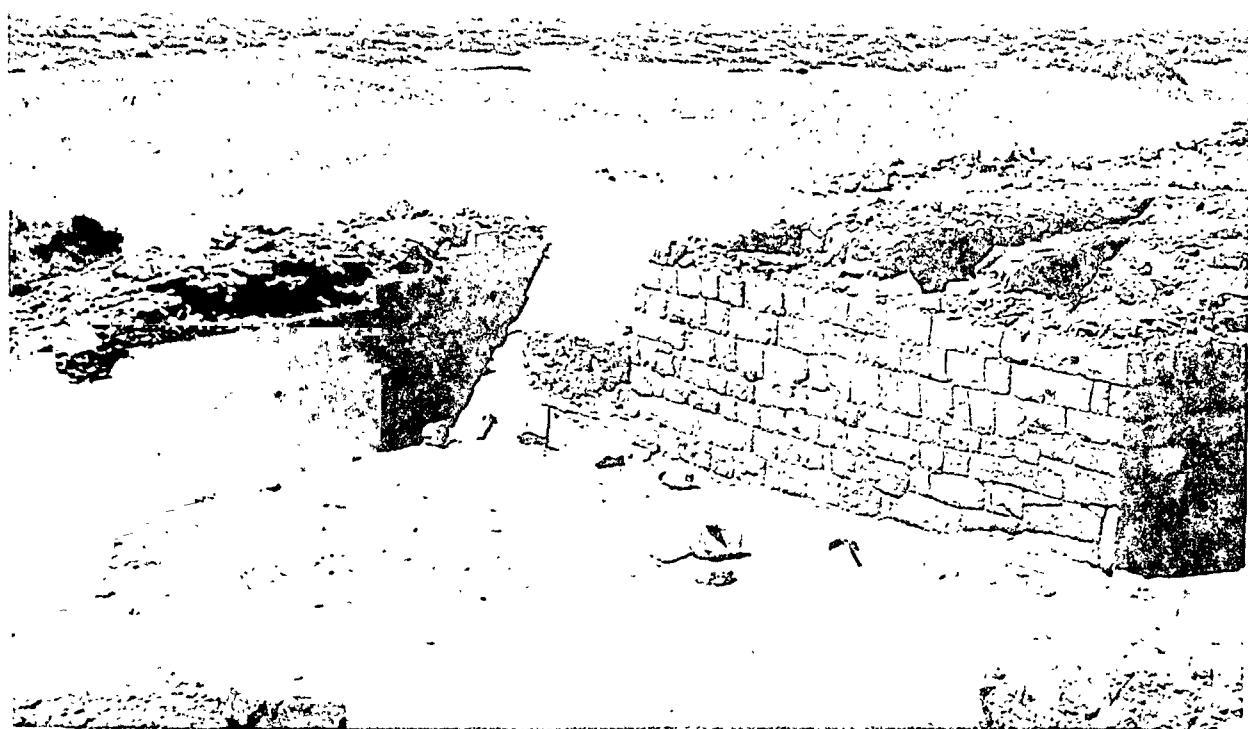
102. Left lion from Timna'.



108. Left lion with infant rider.



104. Rear view of left lion showing dowels for attachment.



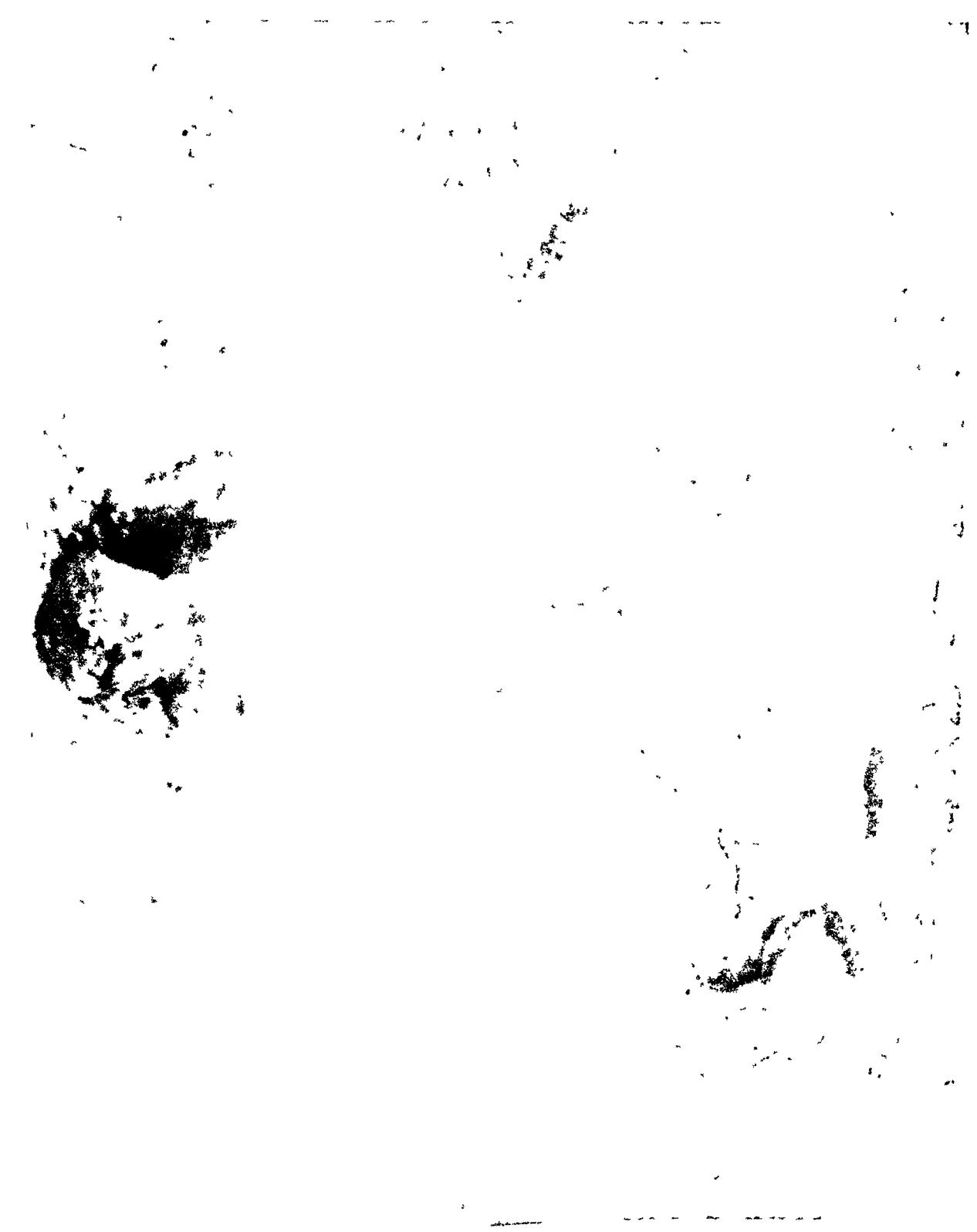
105. South wall of House Yafash, right center. The lions were found at the level of the sixth course below the present top of this wall.



106. Left lion *in situ*.



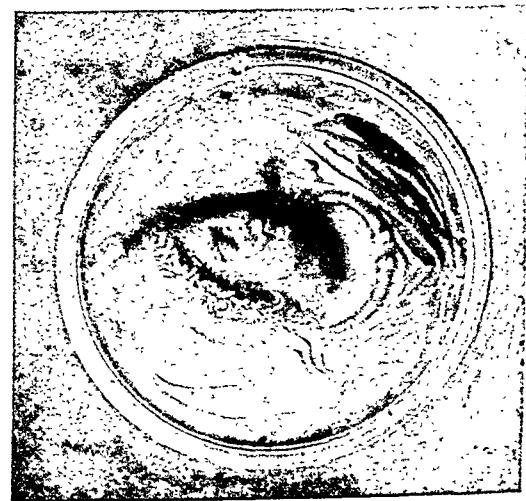
107. The right lion immediately after being discovered.

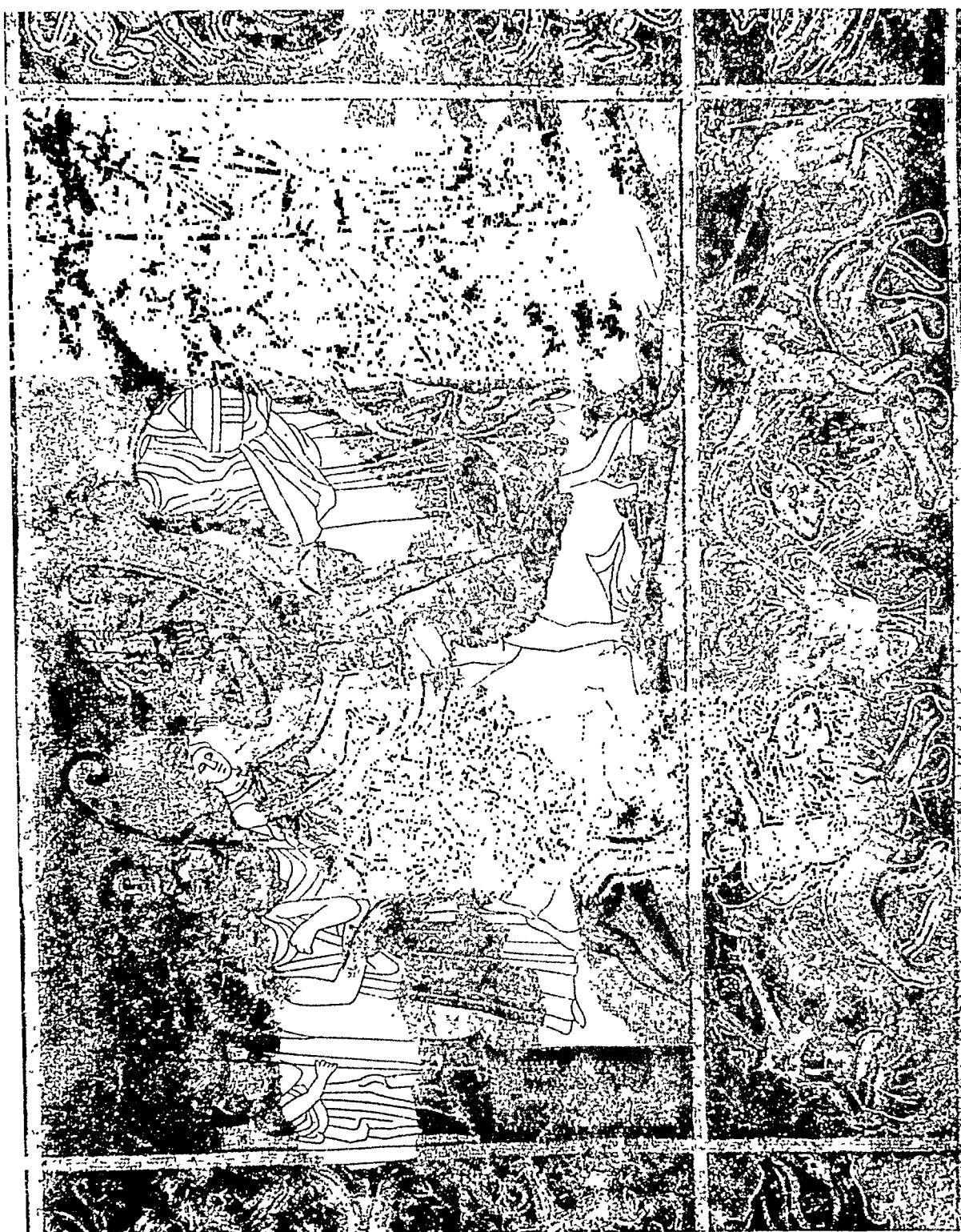


105 The left lion immediately after being discovered

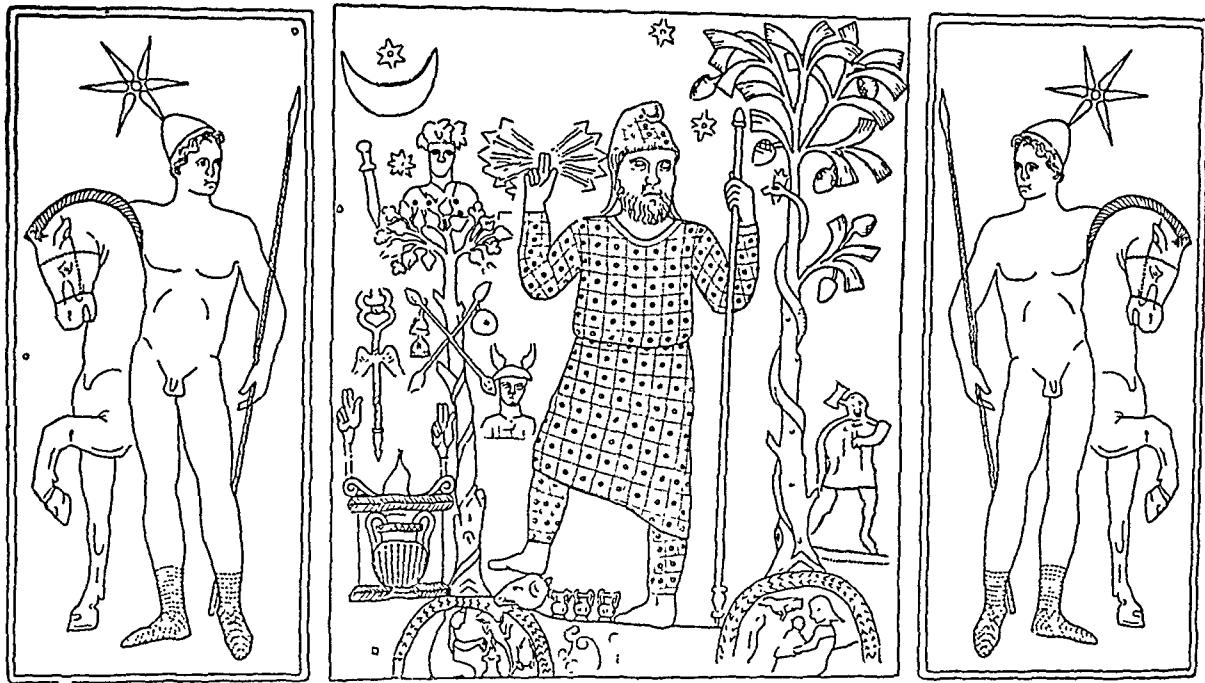


109. Paw (S 42) of left lion.

110. Bronze figure from Galjub, Pelizaeus Museum. (After Ippel, *Der Bronzefund von Galjub*, Pl. 1, no. 6.)111. Silver plate from Hildesheim, Pelizaeus Museum. (After Pernice and Winter, *Der Hildesheimer Silberfund*, pl. v.)



113. Mosaic from Roman villa near St. Leu, Algeria. (After Gauckler, *Inventaire des Mosaïques de la Gaule et de l'Afrique*, III, Pl. 454.)



114. Bronze plaque from an Imperial grave in Spain. (After Almagro, *Las Necrópolis de Ampurias*, II, Fig. 109.)



115. Bronze statuette of Sabazios from Timna⁴.

Report on the Restoration of
THE BRONZE LIONS AND RIDERS OF TIMNA^c

Joseph Ternbach

Dimensions

LEFT LION

Plinth	Length, 20 $\frac{3}{4}$ in.
	Height, 1 $\frac{3}{4}$ in.
	Width, 2 $\frac{3}{4}$ in.
Lion	Overall length from tip of ear to tip of tail, 27 $\frac{3}{4}$ in.
	Overall length from tip of extended (reconstructed) paw to tip of tail, 29 $\frac{1}{2}$ in.
	Height including plinth, 20 $\frac{1}{2}$ in.
	Height with rider, 24 $\frac{1}{2}$ in.

RIGHT LION

Plinth	Length, 21 in.
	Height, 1 $\frac{3}{4}$ in.
	Width, 2 $\frac{3}{4}$ in.
Lion	Overall length from tip of extended paw to tip of tail, 28 $\frac{1}{4}$ in.
	Height including plinth, 19 in.
	Height with rider, 24 $\frac{1}{2}$ in.

INFANT RIDERS in sitting position, holding lions on chains, modeled three-quarters in the round.	Height, 15 in.
	Width, 10 in.

The bronze lions of Timna^c with seated infant riders are made in high relief approximately 5 in. deep, with heads and limbs in full round; the body depth is 3 $\frac{1}{2}$ in. The thickness of the metal varies between 1.5 and 2.5 mm., but in some places it is 3 to 4 mm. thick. Both lions are female with definite attributes of their sex.

The plinths are rectangular in form, with no back, and hollow.

The fine chasing and finishing of these sculptures, made in lost wax casting, indicate that the statues were designed for exhibition at eye level, and were not architecturally sketched. The fine inscriptions on the plinth similarly indicate that these were meant to be read from near distance. The placement of the lions on plinths suggests that the statues were planned to stand on some larger base. The sculptures were placed apparently against some wall-backing, but no clue of the material or nature of that backdrop remains. The dowel structure designed to anchor the statues both to the plinth and (the riders and lions as a whole) to the back wall, is swallowtail in shape; the dowels are perforated for the insertion of wedges from the supporting rest. Therefore, it would seem that the sculptures were not meant to be anchored in a solid wall, since such an attachment would render the dowels meaningless. The fact that the sides of the plinth continue the border of the front design also indicates that more than a frontal view was intended.

The metal is porous, extremely brittle, and heavily corroded. Chemical and spectrographic analyses (see attached reports) reveal that the content of copper is unusually low; the content of tin is also low, but that of lead is comparatively high: This alloy has produced a dark black-brown patina which is seen in places where the heavy incrustation has peeled off; it is not a silvery shimmer as might be expected from the alloy.

The damage to these statues was extensive. Many breaks and missing parts were established when the lions were excavated. These probably occurred at the time of the destruction of the city and perhaps later as a result of plundering; corrosion has also caused its particular kind of destruction to the metal. Subsequent damage occurred in transit and as a result of prior assembly and restoration.

Damage to the statues is not identical. As to the left lion (the statues are identified when standing face to face and from the point of view of the observer), the plinth is cracked at a point 4 in. behind the front foot and, as a result, is bent toward the center for the next 10 to 11 in.—approximately up to the first hind paw. The plinth is uneven owing to ancient damage and required wedging in order to be balanced. The upper level of the plinth is bent at the front hind leg with a consequent dislocation of this leg. The right end part of the plinth is bent downwards. The hind leg is bent just above the ankle; it is dislocated and pushed forward. Both the bending of the plinth and the dislocation of the hind leg have produced a gap of about $\frac{3}{4}$ in. between plinth and sole of foot. The left fore-paw is missing, with indication of new breakage and most probably missing fragments.

On the left front paw there is an indentation close to the ankle and a missing segment of approximately $1\frac{3}{4}$ to $2\frac{1}{2}$ in. including the hind part of the claw. Whether all this is ancient damage could not be determined, since much of the edge showed new breakage. Part of the inside rim is also missing. There is also breakage on the two hind legs, with fragments of $\frac{1}{4}$ to $\frac{1}{2}$ in. of metal missing.

The front of the plinth with the inscription has no missing areas. On the upper level of the plinth, however, an irregular portion of the center, approximately 9 in. long with a depth of about $\frac{3}{4}$ to $2\frac{1}{2}$ in., and a section on the left end, $4\frac{1}{2}$ in. by about $2\frac{1}{2}$ in., are missing. On the lower level of the plinth an area about 7 in. by 2 in. is missing.

In the center of the tail a segment approximately $3\frac{1}{2}$ in. long is missing. The lower dowel of the infant rider is broken off, but is sticking inside and covered with corrosion.

On the right lion, the surface is more corroded, warty and has many charcoal patches. The right hind paw is bent inward above the ankle with a

gradually deepening angle. The elevation from the plinth through this distortion creates a gap $\frac{1}{4}$ in. in front and $\frac{1}{2}$ in. in the back.

The plinth itself caves in the center about $\frac{1}{4}$ in., and there is a variation throughout the whole length of $\frac{1}{8}$ to $\frac{1}{4}$ in.

The saddle of the lion is broken out from the hip toward the center in an irregular line about 5 in. long and $1\frac{1}{4}$ in. across; the center section is bent downwards, but adheres; another triangular section towards the head, about 5 in. long by 1 in. at the widest spot, is broken off. This particular break of the saddle suggests that it occurred with the rider still attached; the statue fell in such a way that the head of the rider was damaged and the saddle of the lion bent under the weight.

An irregular area of about 3 in. on the plinth in front of the left hind paw is missing; and again near the right hind leg another 3 in. is missing; about 4 in. of the inner rim on the right hind leg is missing.

The lions were damaged in transit from the field and were very poorly put together here. Broken sections were not matched up. To keep the detached parts together and support the extremely fragile statues, the lions were completely filled in with a hard plaster of Paris reinforced with pieces of burlap and perforated steel sheets. The plaster which was poured into the bronze subsequently expanded causing many new cracks, splits, and gaps, many of which in turn were filled with plaster and then painted, overlapping on larger areas. This restoration ignored the original shape of the animals, but followed the ancient dislocation of the legs. For instance, in order to stand the left lion up and to fit and balance it on the plinth, the hind leg was elongated with an insertion of plaster. This, in turn, threw the body of the animal out of line. Therefore, once again the gaps were filled with plaster of Paris. The incorrect leaning of the body on the hind leg forced an elongation of the front left leg carrying the fore part of the body and, in this way, caved the saddle and distorted the whole movement of the sculpture. The tail was wrongly mended with a misshapen reconstruction which added to a wrong movement of the tail. The missing front leg and paw were poorly modeled from solid plaster of Paris and cemented to the body.

The plinth of the left lion has two ancient

dowels for attachment; there are two on the body of the lion and indications of three others which are now broken. Near the mane towards the back of the left lion there is a hole for the dowel from the infant rider; the dowel in the center of the body is stuck in and corroded.

To compensate for the distortion of the hind leg and curved plinth of the right lion, the missing areas were filled in with plaster of Paris, without taking into account the placement of the legs, the original line of the plinth, and the dimensions of legs and body. The repairs tried to make up for all these differences in measurements with no sense of what was really required.

The Present Restoration

I cleaned the bodies of the lions, completely removing the recent plaster of Paris filling, and reassembled them to their original shape. The ancient damages and deformations are left intact. I restored them to their true and original forms as indicated and established by the given cleavages and breaks. The guiding points for the restoration of the left lion are the exactly fitting left hind leg and the fitting of the right hind leg on one small area. The location of the paws was definitely established by the fact that the front paw is deeply corroded onto the plinth and was never separated from it. The right hind leg, although broken off the plinth, left marks upon it.

The ancient doweling on the plinth is clearly visible. The broken parts of the body are cemented and reinforced with brass wires.

The right ear of the left lion, missing from ancient times, is restored in cement and attached by one screw so that it can be removed at will. The same is true for the missing forepaw of the right lion where six screws and bars hold the replacement affixed. On the infant rider, the tip of the little finger was missing and I have replaced it. The missing dowel on the stump of the right leg is replaced to fit into the hole on the lion. The back of the skull is missing and was filled in by the previous restorer. I left it as I found it, only cleaning away the overpaint.

On the right lion, the missing paw has been remodeled and replaced. The tail, which was

broken into many pieces, was correctly put together with replacements as needed.

All these new parts have been blended in color to match the original parts, but they remain clearly recognizable. All the mounting is done so that the original dowels are clearly visible.

I have cleaned the outer surface of the lions and infant riders of the overpainting and plaster patches and, as much as possible, I have removed the sand, stone, and charcoal deposits accumulated during burial. I have not removed the incrustation from the sculpture to reach the original bronze surface since the aesthetic result is uncertain, the archaeological need for it is not indicated, and the investment of time and energy do not appear warranted. On many places where the corrosion cracked off, it revealed that the original surface of the bronze is a dark, black-brown patina. However, it is doubtful that this could be achieved all over since the metal in so many places is badly corroded, warty, and damaged.

It is my opinion that these lions were not directly exposed to fire, and that the charcoal remnants grown into the corrosion might have been caused by the statues being embedded in burned timber.

REPORT OF ANALYSES

A sample, consisting of fragments of bronze chips from one of the lions, was submitted to Lucius Pitkin, Inc., metallurgical chemists and consultants, New York, New York, for analysis. The result of their analysis is contained in the following report, no. 530612, dated December 9, 1955:

Qualitative Spectrographic Analysis

Copper.....	Major
Lead.....	Major-Low
Silicon.....	Minor
Tin.....	Minor

Aluminum.....	Minor
Nickel.....	0.X-High
Iron.....	0.X-High
Calcium.....	0.X
Sodium.....	0.X
Magnesium.....	0.X-Low
Molybdenum.....	0.0X
Manganese.....	0.0X
Cobalt.....	0.0X
Silver.....	0.00X

Elements checked, but not found: Zinc, Bismuth, Arsenic, Antimony, Cadmium, Indium, Phosphorus, Chromium, Tungsten, Titanium, Vanadium.

(Major = above 5% estimated. Minor = 1-5% estimated. .X, .0X, .00X, etc. = concentration of the elements estimated to the nearest decimal place, e. g., .0X = .01-.09% estimated.)

The following supplementary report was issued December 27, 1955:

Copper.....	53.88%
Lead.....	20.36%
Tin.....	4.35%

Sample appears to be nonmetallic in character with greenish and white flakes present which could be salts of copper, lead, and clay.

[Dr. Segall has called attention to an analysis of a bronze statuette from Egypt dating in the New Kingdom or later. (See R. Anthes, "Technik und Datierung einiger ägyptischen Bronzen," *Berliner Museen, Berichte aus den Preussischen Kunstsammlungen*, 59, 4 [1938], p. 72.) According to this report, the bronze is composed of the following:

Lead.....	.25.04%
Copper.....	.70.81%
Tin.....	3.03%

Although the copper content of the Timna' bronze lions and riders is somewhat lower than that of this Egyptian statuette, the lead and tin ratios are similar. Whether this points to the use of an Egyptian formula for the composition of the Timna' bronze or is simply a coincidence cannot be determined at present; many more analyses are necessary before we can attain a measure of certainty in this field. Editor.]

Inscriptions Related to THE HOUSE YAFASH IN TIMNA^{e*}

A. Jamme, W.F.

The six Qatabanian inscriptions here described¹ were found in the excavation of the South Gate of Hajar Kohlān, ancient Timna.² All of them deal in some way with the house called Yafaš (Yafash)³ at which or near which they were found. The entrance of this great building is situated on the northeast; its south-

ern wall runs along a small inner square which on the south stops at the two inner bastions of the South Gate of the capital of ancient Qatabān.

The present group of texts is valuable for various reasons. The relative chronology of four Qatabanian kings, which was very obscure, is now clear thanks to Jamme 119/7. The texts illustrate an evolution of script which agrees perfectly with the succession of the different kings of Qatabān. Thanks to the two lionesses and the bronze statue of the priestess Bara'at, the texts of this group and consequently the kings mentioned in them can be dated with a small margin of error in the first century b.c. The history of the House Yafaš emerges from obscurity, at least in part. Several Sabaean peculiarities are attested in Jamme 118. At last, but not least, Jamme 122/2 and the lionesses with their riders illustrate each other in a rather unexpected way.

Miss Höfner has recently published (*HöUQK*) a study of several terms listed in Qatabanian texts mentioning the purchase of buildings; many of them are found in the present collection of texts. Most of these terms do not present any special difficulty: *br*, "to construct, build"; *hg* in *bhg*, "nach der Gebühr"⁴ or "nach der Gebühr, nach dem Recht";⁵ cf. Sabaean *hg*, "law" in CIH 548/14, and "be entitled to" in Glaser 1143/3;⁶ thus *bhg* is better translated as

¹ Cf. *AlCASA*, p. 6, and A. Jamme, "Les expéditions archéologiques américaines en Arabie du Sud (1950-1953) (Avec une brève note sur l'estampage en latex)," *Oriente Moderno*, 33 (1953), pp. 139-40.

² Cf. loc. cit., p. 80.

³ Cf. M. Höfner, "Ta'lab als Patron der Kleinarchitekturen," *Serta Cantabrigiensia*, 1954, pp. 32-33, and A.

⁴ Cf. G. W. Van Beek, "Recovering the Ancient Civilization of Arabia," *The Biblical Archaeologist*, 15 (1952), p. 3, Fig. 2.

⁵ Cf. M. Höfner, "Ta'lab als Patron der Kleinarchitekturen," *Serta Cantabrigiensia*, 1954, pp. 32-33, and A.

"according to the right" or "according to the regulations"; *klsm/glsm* (cf. *klhmw/glm* in Jamme 118/4 and *kls/glm* in Jamme 121/2), "all together";⁷ *swṭr*, "to put the foundation of";⁸ *sy*, "to acquire"; *ṣrh*, plural *ṣrht*, "upper room";⁹ *qny*, "to take into possession"; and finally *šm*, "to buy."

A few other terms require explanation.

1. *ḥtb*¹⁰ (Jamme 118/2, 119/2, and 121/2) is followed by *ṣrht* in RÉS 2849/2, 3858/8, 3962/2-3, etc.; this order is reversed in Groom-Beihan 19 a.¹¹ In Jamme 121/2, *ḥtb* is undoubtedly a building separate from the House Yafāš, since it is indicated by the proper name *Yariš*. RhKTB's translation as "foundation, substructure"¹² is presented without any etymology and on the basis of the opposed pair *ḥtb-ṣrht*. This interpretation is disproved by Jamme 121/2, where *ḥtb* means "a kind of building," for the following reasons. (1) *ḥtb* and *ṣrht* are not, as usual, coöordinated (e.g., Jamme 119/2-3), but subordinated; it is difficult to understand how a "foundation" could have "upper rooms." (2) *ḥtb* has a name which is only used for locality, house, well, etc. (3) The stone bearing Jamme 118 was found in one of the small rooms located in the north and adjoining the House Yafāš. This fact suggests that the whole block of buildings was divided into two parts with two different functions: the one to the south served as house and the one to the north as *ḥtb*. The Semitic root *ḥtb*, as attested in Arabic, Hebrew, and Ethiopic, and also in *Datīnah*¹³ and *Sogotri*,¹⁴ has the meaning "to cut wood." It is noteworthy that *ḥtb* has influenced the following Arabic roots, *ḥsb*, *ḥsb*, and *ḥsb*; cf. "tronco di travi *hašabeh*, coll. *hašab*, plur. *'ahšāb*: da ardere *haṭab*; *sūg al-ḥaṭab* mercato della legna,"¹⁵ and

Jamme, "L'identification de Ta'lab au dieu lunaire et les textes sabéens G1 1142 et 1143" *Bibliotheca Orientalis*, 13 (1956), pp. 182-186.

⁷ For *gl*, cf. RhKTB, II, p. 15, footnote 5.

⁸ Cf. also CoRoC, p. 142 B, and A. F. L. Beeston, *Sabaeian Inscriptions* (Oxford, 1937), pp. 9-10.

⁹ HöUQK translates *ṣrht* by the singular "Oberbau" (p. 74) or "Oberbauten" (p. 77).

¹⁰ For the interpretation of this noun, cf. commentary on RÉS 2849/2, and M. Höfner, in WZKM, 40 (1933), p. 33, on RÉS 2916 (Minaean).

¹¹ Cf. *Le Muséon*, 64 (1951), pp. 115 and 117; the village mentioned on p. 115 is not "al-Thirra" (which would in any case be "ath-Thirrah"), but "ed-Dirah."

¹² Cf. p. 92; this opinion adopted by G. Ryckmans in RÉS 2849/2 and later in Groom-Beihan 19 a: "substructure" (sic; cf. *Le Muséon*, 64 [1951], p. 117); cf. *JadME*, p. 11.

¹³ Cf. C. Landberg, *Glossaire datīnois* (Leiden), p. 437.

¹⁴ Cf. W. Leslau, *Lexique sogotri* (Paris, 1938), p. 170.

¹⁵ Cf. E. Rossi, *L'arabo parlato a Ṣan'a'* (Rome, 1939), pp. 216 B and 146, respectively.

haṣab, "firewood";¹⁶ cf. also the medieval Hebrew *ḥittūb*, "sculpture," and the Mishnaic and Talmudic Hebrew *ḥāṭābāh*, "cutting, chopping."¹⁷ I propose translating Qatabanian *ḥtb* as "workshop, workroom." The presence of *kl* preceding *ḥtb* in Jamme 119 does not offer any difficulty; there were several small rooms in the north section of the building Yafāš. As a matter of fact, the excavators have found in these rooms several crucibles used by coppersmiths. My translation of *ḥtb* is in line with that of "Magazin" proposed by M. Höfner,¹⁸ which may now be more precisely defined with the help of the new archaeological evidence, suggested by Jamme 118.

2. *zrb* (Jamme 118/1 and 119/2), cf. Arabic *zariba*, "to be attached to, stick to."¹⁹ RhSLG²⁰ offers a study of the verb *zrb*, where he points out four different uses: (1) an abstract noun, *zrb* (RÉS 3959/3); (2) a verbal phrase (RÉS 3958/13, 3960/2, 3961/3, and CIH 618/3); (3) the concrete Qatabanian term *zrbt*, plural *zrw̄b*, Sabaean *'zrb*, meaning "a lot with building" (RÉS 3854/2, 3540/5, and 3880/4); and finally (4), the verb *zrb* meaning "eine *commendatio* zugunsten der Götter (*b + hg*) veranlassen" (same references as 2). First of all, *bhg* is related not only to *zrb*, but also to all the other verbs; this consideration is all the more obvious since in Jamme 118/1-2 the verb *zrb* is the third in a series of six verbs. In any event, *bhg* does not in any way affect the basic meaning of *zrb*. Furthermore, there is no evidence for the same interpretation of *zrb* in the references in RhSLG's second series; *zrb* is an adjective in RÉS 3959/3²¹ and

¹⁶ Cf. C. Rabin, *Ancient West-Arabian* (London, 1951), p. 26.

¹⁷ Cf. R. Grossman, *Compendious Hebrew-English Dictionary* (Tel-Aviv, 1951), p. 112 B.

¹⁸ Cf. WZKM, loc. cit.

¹⁹ Cf. E. W. Lane, *Arabic-English Lexicon*, p. 1909 C; RhSLG (II, p. 119) relates to Arabic *zarib*, "Bergvorsprung."

²⁰ Cf. III, p. 13.

²¹ RÉS 3959/3: *wlmw/bny/hfnm/ltwfyn/rdhwlm/b'l'm/zrbm*. This text is translated by RhSLG, III, p. 21, as follows: "Und sie (die vorgennanten Gewährsmänner) haben sich mit den Banū HFN verträglich verabredet (geeinigt), auf dass deren-Landbesitz voll nutzbar (ungestört) sei auf Grund einer gewährleistenden Urkunde." The preceding translation is freely rendered by G. Ryckmans (cf. RÉS, VII, p. 15) as follows: "Et ils se portèrent caution pour les Banū Hufnim, pour que la propriété de leur terre fût valable (incontestée), par un document de garantie." However, in G. Ryckmans' translation of RÉS 3959/3, "document" is used for both *l'm* and *wtf*. The verb *l'm* is wrongly translated by G. Ryckmans by "se porter caution pour"; but it only means "to reassemble, be close to, come near" or "to rectify, consolidate what was disordered or unsettled" (cf. E. W. Lane, loc. cit., p. 3013 A). The term *b'l'm* is interpreted as composed of the preposition *b* and the noun *'l'm*; but another translation is possible. As to the verbal form *twfy*, RhSLG

3961/3, an infinitive in RÉS 3960/2, and a noun in CIH 618/2 and RÉS 3958/13.²² Finally, as regards *RhSLG*'s third point,²³ it is unnecessary to consider *zib* as singular, since *zib*, as well as, e.g., *bif*, "year,"²⁴ may have different plural forms; in the texts referred to by *RhSLG*, the noun *zrb* applies to absolute possession of ground, and not necessarily to ground with building on it. *HoUQK* translates the verb *zrb* as "sicherstellen gegen fremde Ansprüche, eine Garantie erlangen."²⁵ It is not necessary to indicate any connection with a third person, for "to assure definitively" alone renders the idea expressed by *zib* perfectly well.

3. *mśwd* (Jamme 118/2), cf. commentary on Jamme 191 (= RÉS 1708) /2;²⁶ in B. M. 103059/3, G. Ryckmans translates by "lieu de sacrifice";²⁷ but "sacrifice" does not allude to the fact that the object offered to the divinity is consumed by fire, and the idea of "sacrifice" is normally rendered in South Arabian by the root *dbh*. A few years before, the same author had adopted the plausible rendering: "autel à holocaustes,"²⁸ which is much better, but not precise enough. J. Ryckmans' suggestion, "terrasse(?)"^{29,30} must therefore be discarded. In Jamme 118, *mśwd* means an "incense altar

(in, p. 20) justifies his translation in referring to Hal 152/13 (read 14, cf. CIH 51b) and GI 904/15-16 (read 16, cf. RÉS 2726). G. Ryckmans refers to the latter text, unfortunately, all the cited inscriptions have *twsj* and not *twsj*. The first and second forms of a verb do not necessarily have the same meaning as the fifth or the sixth form. The expression 'rdhm v is translated by G. Ryckmans as "la propriété de leur terre," but the idea of "propriété" is certainly not mentioned in 'rd, and comes from the interpretation of *twsj*, besides, 'rd is not obviously the subject of *twsj*. Finally, *zrb* is translated as an abstract noun. I propose interpreting *bny/hfnum* as subject of *twsj*, 'rdhmw as direct complement of the verb, *b'l* as the *status indeterminatus* of *b'l*, "master," and *zrb* as an adjective related to *b'l*. I thus suggest translating the text as follows "and they established the descendants of Husnum so that the latter could secure title to their land [as] permanent master(s) "

²² No difficulty can arise from the comparison between CIH 618/2 *qbrN/zrbM*, and RÉS 3961/3: *mqbrM/zrbM*, the endings of the first two nouns indicate clearly enough their grammatical relationship to the following word

²³ Cf. also *RhKTB*, II, pp. 15-17.

²⁴ Cf. *HoASG*, p. 103, cf. also A. Jamme, "South-Arabian Inscriptions," *Ancient Near Eastern Texts Relating to the Old Testament*, 2nd edit (Princeton, 1955), p. 511A, no. 13, for the translation of RÉS 3510.

²⁵ Cf. p. 79, with reference to *RhSLG*, III, p. 34, where only the simple affirmation of both the profane and religious meaning is found; it would have been better to refer to *RhSLG*, III, p. 13, where the complete study is presented

²⁶ Cf. *Le Museon*, 67 (1954), p. 327

²⁷ Cf. loc. cit., p. 106; *HoUQK*, p. 77: "Feueraltar."

²⁸ Cf. *RyRAP*, p. 31, two pages below (p. 33), the same French expression renders *mśrb*

^{29,30} Cf. *Bibliotheca Orientalis*, 12 (1955), 208

sanctuary" rather than an "incense-altar," since the other nouns mentioned in lines 2-3 refer to large constructions.

4. *nfs* (Jamme 118/3 and 119/3): the question of the interpretation of this noun is summarized in *JaPEHA*;³¹ for Jamme 312 A/3, A. F. L. Beeston suggests "funeral monument,"³² and G. Ryckmans "stèle funéraire."³³ These two interpretations, which are virtually identical, are quite unsuited to other inscriptions which must be taken into consideration and which have already been mentioned in *JaPEHA* (*loc. cit.*).³⁴ On the other hand, *HoUQK*'s etymological research³⁵ leads to a translation of *nfs* as "Erleichterung." Jamme 118 is still clearer than its parallels already published, and does not allow any uncertainty. The plural pronominal *sm* with *nfs* and *sfd* refer to the House Yafash and to all its listed parts and certainly not to the subject of the verbs, for this subject is singular. Thus *nfs* must be a special part of the house. Cf. Accadian *nappašu*, "aperture for air or light, window," from *nappašu*, "to enlarge";³⁶ and Arabic *mansās*³⁷ or *mansas*,³⁸ plural *mandas*, and also *mutanaffas*, "living room"; cf. also the Hebrew *niphil wayyinnāfēš*, "and he took a breath, refreshed himself,"³⁹ and the Medieval Hebrew *nōfēš*, "rest, repose"; on the other hand, cf. in Dāqīnah *naffis li*, "make room for me," and *tanaffasa*, "prendre ses aises."⁴⁰ On the basis of the preceding remarks, as well as the fact that *nfs* follows *sht* in Jamme 118/3 and RÉS 3962/3-4, I suggest translating *nfs* as "roof-terrace"; a roof-terrace fits a tomb as well as a house.

Another problem related to *nfs* is the interpretation of -*h-* and -*hy-* attested in the following quotations: *nfs-h-sm* in RÉS 3962/4 and Jamme 118/3; *nfs-h-syw* in Jamme 313 A/2-3, 1, B/2, 3-4, 311/2; and *nfs-h-sww* in Jamme 119/3. *HoUQK*, to which the third example was unknown,⁴¹ presents the following explanation:

In SE 93 [RÉS 3962] steht *nfshysm*, in Jamme 353 und 311 *nfshsyw*; in jedem Fall ist es Akkusativ. In der letzten genannten Form mit dem diphthongischen Suffix ist wohl die Endung -*hy* von *nfs*, die vor dem Plur.-Suffix in SE 93

²² Cf. pp. 186-187, commentary on Jamme 313 A/2.

²³ Cf. *Le Museon*, 66 (1953), p. 178

²⁴ Cf. *Syria*, 30 (1953), p. 293

²⁵ Cf. *JaDML*, p. 22.

²⁶ Cf. pp. 77-78

²⁷ Cf. C. Bezold, *Babylonisch-assyrisches Glossar* (Heidelberg, 1926), p. 203 A

²⁸ Cf. M. Beaussier, *Dictionnaire arabe-français* (Algiers, 1931), p. 977 B

²⁹ Cf. H. Wehr, *Arabisches Wörterbuch* (Leipzig, 1952), p. 876 B

³⁰ Cf. L. Kochler-W. Baumgartner, *Lexicon in Veteris Testamenti libros* (Leiden, 1953), p. 626 A.

³¹ Cf. C. Landberg, *Glossaire datinois*, p. 2807.

³² Cf. p. 75, end of footnote 2.

steht und ebenfalls einen Diphthong enthält, verkürzt worden. Eine Akkusativ-Endung -*ahay* des plur. sanus ist -neben -*ay*, aus dem es wohl entstanden ist- für das Qatabanische auch sonst belegt.⁴⁰

The preceding interpretation is confirmed by the parallel study of Jamme 118 and 119:

Jamme 118: *byt-hw, ḥtb-hw, msqft-hw, srḥt-y-hw, nfs-hy-sm,*
 119: *byt-s, ḥtb-s, msqft-s, srḥt-sww, nfs-h-sww.*

The second text shows an obvious tendency to use the simple form of the pronoun, except in the two cases where -*y-* is omitted and -*hy-* is written in *scriptio defectiva*. Besides, there is a strong tendency to balance plene and defective writing: -*hy-* with -*sm* on the one hand, and on the other -*h-* or -*y-* with -*sww* (masculine) and -*syw* (feminine). Furthermore, the above parallels suggest that -*hy* (+ -*sm*) or -*h* (+ -*sww* or -*syw*) was only used with internal plural (*nfs* and *rfd*).

118—Hewn stone from building set into upper course of the southern wall of the House Yafaš; intact; photographs and squeezes. T.S.m.⁴¹

STONE: 62 × 32 cm. INSCRIPTION: lines 1-5, 52.5 × 3.5 cm.; line 6, 36 × 3 cm.; space between the lines between 0.5 and 0.6 cm.

- 1 *hwf'm/bn/tnwb/fm/wqny/w'sy/wzrb/wbny*
- 2 *wshdt/bythw/yfš/w'ḥtbhw/wmswdhw/ wmsqft*
- 3 *w/mšrqytm/bndn/bytn/wṣrḥtyhw/wnfshysm /wrfdhysm/bn*
- 4 *ṣrsm/d/fr'm/klmw/glm/bhg/'nby/w'l/tly/ b'ttr/wb/'m*
- 5 *wb/'nby/wbdt/ṣntm/wbdt/zhrn/wb/mr'hw/ yd'b*
- 6 *ḡyln/bn/fr'krb/mlk/qtbn*

- 1 Hawfi'amm, son of Tawnab, has bought and taken into possession and acquired and secured title to and constructed
- 2 and restored his House Yafaš and its workshops and its incense sanctuary and its arcades,

⁴⁰ Cf. p. 79; cf. also *RhSLG*, I, pp. 42-43, contrary to A. F. L. Beeston, in *Bibliotheca Orientalis*, 10 (1953), p. 200.

⁴¹ For easy reference, I use the letters of the alphabet to designate the large inscriptions of the South Gate, preceded by T[imna'] S[outh Gate].

- 3 east from this house, and their two upper rooms and their roof-terraces and their parapets (?), from
- 4 [the] foundation to [the] top, all together, according to the law of 'Anbay and of 'Il Ta'alay. By 'Aṭtar and by 'Amm
- 5 and by 'Anbay and by Dāt-Ṣantim and by Dāt-Zahrān and by his lord Yadi'ab
- 6 Gaylān, son of Fari'karib, king of Qatabān.

The inscription follows a pattern frequently used for commemorative texts concerning the construction of a house; an abbreviated example is RÉS 3964. The series of verbs is longer than that of RÉS 3882, and the nomenclature of the parts of the house is more diversified than that of RÉS 3962 and B. M. 103059.

For my view on the historical event connected with the use of -*h-* (instead of -*s*) in some Qatabanian texts, cf. my article "Sabaean Inscriptions on Two Bronze Statues from Mârib (Yemen)." ⁴²

L. 1: *hwf'm*, cf. Jamme 294/1 and commentary.—*tnwb*, *qawtal* form; cf. Arabic *taniba*, "to feel bad."

Ll. 1-2: the five verbs ⁴³ fall into three groups.

The first series mentions the fact of possession (*qny* and 'sy), preceded by its juridical basis (*ṣm*). The only verb occurring in the second series is *zrb*, which refers to the act of assuring possession, securing title; this verb ordinarily comes last in series of this kind (e.g., RÉS 3962/2); here, as well as in B. M. 103059, it precedes the third series formed of two verbs (*bny* and *shdt*) which relate to material activities.⁴⁴ Ordinarily *bny* precedes *shdt* (cf. RÉS 3880/5, 3881/1, etc.).—*bythw/yfš*, cf. *byts/yfš* in RÉS 2789/2 (Minaean); *yfš* is also a proper name in RÉS 2762 (Minaean) and CIH 855/2 (Sabaean); in RÉS 4094/2, *yfš* is the first element of a sentence which is the name of a house.⁴⁵

Ll. 2-3: *msqftbw/mšrqytm/bndn/bytn*, cf. *tny/ msqfn/mšrqy/wm'rby/hyt/srḥtn*, "the two arcades east and west from these upper rooms," in CIH 132/2-3 (Sabaean) and *nṭt/ttr/srqn/*

⁴² *Journal of the American Oriental Society*, 77 (1957). pp. 34-36.

⁴³ Cf. also *RhSLG*, III, p. 35.

⁴⁴ Cf. *RhKTB*, II, p. 15.

⁴⁵ Cf. M. Höfner-N. Rhodokanakis, in *WZKM*, 43 (1936), pp. 211-212.

mšrqy/hgrn/hnn "the *n̄t̄t* [kind of building] of 'Aṭṭar Ṣaqān, east of the city Ḥanān" in RÉS 4663/3-4 (Sabaeans); in these two parallels the preposition is understood.⁴³ For *msqf*, plural *msqst* (also in RÉS 4461), cf. Arabic *saqfa*, "to roof, vault over," and its derived forms *saqf*, "arched, vaulted roof, sloping (not flat)," and *musaqqaf*, "roofed over," and also the modern Yemeni noun *sagif* (*g* for *q*), "vestibolo aperto"⁴⁴ and "entrance hall on the ground floor of a Yemeni house (actually without windows)";⁴⁵ *msqf* may possibly be translated as "vaulted passage, arcade."—*bndn* without any word divider; *bn*, preposition indicating the starting point.

L. 3: *rfd*, cf. M. Höfner, K. Mlaker und N. Rhodokanakis, in *WZKM*, 41 (1934), p. 93.

Ll. 3-4: *bn/ṣrsm/’d/ṣr’m*: well-known expression (e.g., RÉS 3552/3-4) composed of two perfectly symmetrical halves and indicating the totality of a building in the vertical direction; cf. parallels in Minaean *bn/ṣrs/’d/ṣqrn* (e.g., TaAM 5 = Jamme 401/2) and in Sabaeans *bn/mwṭrm/’d/ṣqrn* (e.g., RÉS 4626/1).

L. 4: *’nby*, name of the Qatabanian lunar god, the most popular after 'Amm;⁴⁶ his temple Riṣāfum was located on the western slope of the hill of Ḥeid bin 'Aqil.⁴⁷—*l/t’ly*,⁴⁸ the god *l* belongs to all Semitic pantheons. He was wrongly identified by D. Nielsen with the South-Arabian moon-god.⁴⁹

Ll. 4-5: South-Arabian final invocations are either homogeneous, referring either to gods (e.g., RÉS 3015) or to men (e.g., Jamme 122), or heterogeneous, referring partly to gods, whose names always precede human names, and partly to men.

L. 4: *’lṭr*: South-Arabian star-god;⁵⁰ he is usually

⁴³ Cf. *RhSLG*, II, pp. 33-34, N. Rhodokanakis, in *WZKM*, 43 (1936), p. 61, and *CoRoC*, p. 199 B.

⁴⁴ Cf. E. Rossi, *loc. cit.*, p. 159.

⁴⁵ Cf. S. D. Goitein, *Travels in Yemen* (Jerusalem, 1941), p. 88 A.

⁴⁶ Cf. *JaP*, pp. 81-83, and *JaRSAP*, p. 269.

⁴⁷ Cf. *JaPEHA*, e.g., pp. 6-7.

⁴⁸ Cf. *JaP*, pp. 113-115, and *JaRSAP*, p. 269.

⁴⁹ Cf. *JaP*, p. 114, and A. Jamme, "D. Nielsen et le panthéon sud-arabe préislamique," *Revue Biblique*, 55 (1948), pp. 227-244. R. Dussaud identifies *l* with both *ṭwr* and *lmqh* (cf. *La pénétration des Arabes en Syrie avant l'Islam* (Paris, 1955), p. 128); it is an error, for *ṭwr* and *lmqh* are names of the moon-god.

⁵⁰ Cf. *JaP*, pp. 85-87, and A. Jamme, *Le Muséon*, 68 (1955), p. 317, and *JaRSAP*, pp. 264-265.

named first in the final invocations,⁵¹ though the moon-god is the principal deity; this seems to go back to the ancestral religion of the South Arabians. Cf. also the commentary on Jamme 122/2.—*m*, Qatabanian lunar god.⁵²

L. 5: *dt/ṣntm* and *dt/zhrn*, two principal appellations of the Qatabanian sun-goddess.⁵³

L. 6: for the two kings, cf. *AlCASA*, p. 9 and especially Jamme 119/7 and commentary.

The lettering of this inscription is not very elegant. Several vertical strokes are slanting. Here are a few details. The circles of *w*, *y*, and *ṣ* are sometimes angular and sometimes elliptical. The two horizontal bars of *d* divide the oblong space formed by the two verticals into three equal parts. The two superimposed elements of letters like *s*, *k*, *s*, etc., are equal in height. The length of the horizontal bar of *b* is almost equal to two-thirds of the height of the vertical strokes. The left part of *m* is a slightly bent curve. The *f* is no longer lozenge shaped, but consists of two opposed curves, which sometimes end in a small vertical stroke.

119—Stone slab built into the same wall as the preceding; on the third course from the top in 1950-1951 and 1.50 m. to the left and below the preceding inscription; lower right corner broken; photograph and squeeze. — T.S.n; photograph and translation in W. Phillips, *Qataban and Sheba* (New York, 1955), pp. 100 and 101, respectively (Plate 117).

STONE: front, maximum length 73.5 cm.; width 39 cm. INSCRIPTION: length of the lines from 56 to 57 cm.; letter height from 3.5 to 4 cm.; space between the lines 0.5 cm. Mr. C. H. Inge, former Director of Antiquities of Aden, has shown me the three great fragments from the lower right corner; they help to restore the text, whose reading is now perfectly clear.

⁵¹ *RyRAP*'s affirmation, according to which the star-god "occupe le premier rang chez les divers peuples de l'Arabie méridionale" (p. 41) is correct only in this sense. Nor is there evidence for R. Dussaud's interpretation of it, "cela doit s'entendre de la faveur populaire, non du rang hiérarchique" (*loc. cit.*).

⁵² Cf. *JaP*, pp. 78-83, and *JaRSAP*, p. 263.

⁵³ Cf. *JaP*, pp. 107-108, and *JaRSAP*, p. 267.

- 1 ḡaybūn, bñ yərbi'ñ, wəbħm, whwʃm, d̄t̄w
 2 mħṣr̄m ʃm, wərb, b̄yts, yj̄s, wkl, yħbs
 3 wərbi'ñ, wnfsh̄w, wnsq̄fis, klm, glm
 4 b̄zg 'nb̄r, b̄ytr, wbm, ab, 'nb̄y, wđ, wifw
 5 glm wħd̄i šnm, wħd̄i ʃmn, wħmrs, §
 6 hr ygl yħargib bn hawf̄m, yħrm̄, mlk, q
 7 tħan wħi irħab, dd̄ħan d̄l, wħbwl, Sh̄r
 1 Tuwaybūn, son of Yəsħrītāmm,—and Šabbūm
 and Hawf̄āmm, men
 2 of [the family] Məħasniyyūn,—has bought and
 secured title to his House Yafāš and all its
 workrooms
 3 and its upper rooms and its roof-terraces and
 its arcades, all together.
 4 according to the law of 'Anbay. By 'Aitar and
 by 'Amm and by 'Anbay and by Wardiū,
 5 He of Latiñ, and by Dāt-Santim and by Dāt-
 Zahrān, and by his lord Sa-
 6 hr Yaqil Yuhargib, son of Hawf̄āmm Yuhan-
 im, king of Qa-
 7 tabān, and by Farikarib, he of [the clan]
 Darħān, paternal uncle and regent of Sahr.

This inscription is more concise than the preceding, both in the number of activities specified by the verbs and in the enumeration of the parts of the house, which is the same on both texts, as is to be expected from their provenience. The god 'Il is no longer mentioned with 'Anbay as source of the obligation which led to the actions of these men. However, the final invocation is enriched by the name of the god Wardiū, inserted between the two groups of divine names which designate the moon-god and the sun-goddess respectively, and which ends with valuable information about Farikarib. In this text no trace of Sebaean linguistic peculiarities is found.

L. 1: ꝑaybūn, quatinum form; cf. ꝑaybūn (e.g., Jamme 284 1); the verb ꝑayb is well known in South Arabian and its derived proper names (cf. commentary on Jamme 284 1). e.g., ꝑaybīl in Jamme 218/1. The preceding interpretation of ꝑaybūn is more likely to be correct than that ꝑaybūn is a quatinum form like ꝑayb in Jamme 118 1—yərbi'ñ, e.g., Jamme 177/1 and commentary. The engraver forgot to cut * and instead cut m, which he then erased by widening the lips of the letter, but which remains clearly visible on the stone. He achieved the correction by cutting * more deeply than the other letters.—sħ. b̄m, cf. Jamme 112 (= R̄ES

3902 bis, No. 131) /2 and commentary on Jamme 161/1—d̄t̄w, masculine plural demonstrative pronoun; cf. R̄ES 3566/21.⁵⁸

L. 2: mħṣr̄m, Jamme 120, 121/1, and also 302 and 303.—s̄m, wərb, singular. The actions specified by the first verb agree grammatically with the first of several persons given as subjects of the verbs; the other elements of the verbal series are infinitive; this phenomenon is rather frequent in South Arabian. The other two persons were presumably brothers of Tuwaybūn, the chief of the family.

L. 3: nfsh̄w, cf. the feminine parallel njs̄hsyw in Jamme 343 A, 2-3.

L. 4: wifw, divine patron of property limits and consequently also of irrigation.⁵⁹

L. 5: l̄m, name of sanctuary, place or clan; cf. the Thamudic personal name l̄m⁶⁰ perhaps derived from the root l̄f according to the other Thamudic personal name l̄f.⁶¹

Ll. 6-7: for the three kings, cf. *ALCASA*, p. 9.—d̄ħlm, name of a very important clan of Timma⁶²—d̄l, R̄ES 3869/1—ħwl, cf. the verb ħwl in R̄ES 3858, 3 and the nouns ħwll in R̄ES 3566 6 and ħwll in R̄ES 3158/3; in these references, the root ħwl refers to administration.

The last part of line 7 clarifies the genealogy of four members of the royal house of Qatabān. Sahr Yaqil Yuhargib mentioned in line 6, must be the same person as Sahr on line 7. The engraver had no reason to repeat the entire royal name, for it is fully given in line 6. On the other hand, if the two were not the same person, the text would have specified the fact more clearly. It would have been very easy to engrave eight lines on the stone; the engraver could have cut his first line higher, which would have given him sufficient space for an extra line. Therefore, Hawf̄āmm, father of Sahr Yaqil Yuhargib, is the brother of Farikarib, and the latter was regent or governor when this inscription was cut. It is important to note that the name of Farikarib is not followed by the name of his father, but only by that of his tribe. This suggests that he may have been an usurper. And since it was he who was regent at the time of our inscription, the

⁵⁸ Cf. *HJASG*, pp. 40, 47.

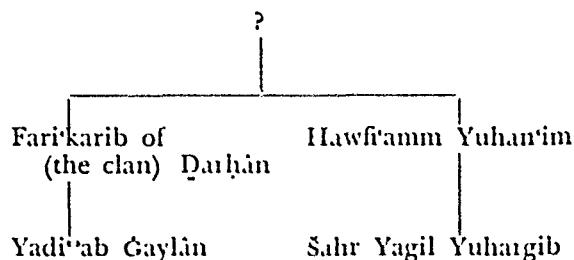
⁵⁹ Cf. *JEP*, pp. 124-125, and *JARSAF*, p. 271.

⁶⁰ Cf. *WDSIT*, p. 135; *HU* 237.

⁶¹ Cf. loc. cit. p. 45; *HuIR* 137.

⁶² Cf. *JEPH4*, pp. 40-52.

reigns of both his brother and his own son did not extend over many years. The genealogy of the four kings may be presented as follows:



The lettering of this inscription is beautiful: *w* is very much flattened; the upper part of *y* and *s* is elliptical; the upper stroke of *b* as well as the two slanting strokes of the left part of *m* are curved in; the ends of the vertical strokes (e.g., *b*, *k*, etc.) and the slanting lines (e.g., *t*) show a slight swelling which diminishes slowly towards the center and outlines a design formed of two curves spreading at the top and gathered at the middle. The ends of the letters have the form of an isosceles triangle whose sides are curved in and whose center is more deeply sunk into the stone; the center of the curve of *r* is also more deeply incised than the rest of the letter; *t* is composed of a short central vertical stroke with two small slanting lines at the ends; the section of each stroke is that of an isosceles triangle whose top is slightly rounded. However, the letters do not yet belong to the beautiful calligraphic style of most inscriptions of *Sahr Yagil Yuhangib*; they are less elongated; the central line of *n* is very slightly slanted, and the central lines of *d* are still horizontal.

m'mr, cf. *JaPEHA*, p. 195, and A. Jamme, "Inscriptions sud-arabes de la collection Ettore Rossi," in *Rivista degli Studi Orientali*, 30 (1955), pp. 114-115, footnote 1, and *idem*, *De la méthode en épigraphie* (Washington, 1956), p. 26, footnote 16.—*d*-/*wbn*, cf. *JaPEHA*, pp. 20-22, formula O.—*swy'm*, preferably *qutaylum* form,⁶¹ cf. Arabic *sā'a* (*u*), "to be left by himself"; this proper name could also be interpreted as a *qawtalum* form (*ṣawya'um*); cf. Arabic *sā'a* (*i*), "to run and be in a state of commotion"; the reading *ṣuway'um* is better than that of *ṣa-wi'um*.⁶²—*b1ṣfm*, e.g., Jamme 338/2.

120—TWO STATUES: in bronze; each one composed of a lioness and an infant rider; found at the foot of the southern wall of the House Yafaš; damaged by the fire which destroyed Timna'; restored by Mr. Joseph Ternbach in New York (N. Y.) (Plates 97-103).

Bases: quotation: T.S.(E); the back is hollow; the base supporting the right lioness was broken in the center, its inscription is very well preserved; the other base was intact; length 52 × 4.2 cm.; width of the upper rim 0.7 cm., and of the lower 1 cm.; thickness of the rim 0.2 cm.—*INSCRIPTION*: cast with each base; identical in both cases; letter height 2.1 cm.

twyb'm/w'qrbm/dwy/mhṣn'm/ṣymw/yfṣ
Tuwaybum and 'Aqrabum, these two men
of [the family] Muhaṣni'um, have inaugu-
rated [the House] Yafaš.

'*qrbm*, RÉS 3914/1; cf. '*qrb* in Jamme 158 and '*qibn* in CIH 345/1 (Sabaeans).—*mhṣn'm*, also in the following text Jamme 121/1; cf. Jamme 302 and 303.—*dwy*, regular form of the dual demonstrative pronoun.—*ṣym*, cf. *ṣmy* (dual) in Jamme 491 = RÉS 4708/1, and A. Jamme, in *Le Muséon*, 67 (1954), pp. 324-325.⁶³

The two lionesses, the infant riders, and their inscription bring up several questions⁶⁴ whose

⁶¹ Cf. E. Sachau, *Ibn Saad. Bd. IX: Indices*, pp. 107-108.

⁶² Cf. *JaPEHA*, p. 153.

⁶³ [The translation "inaugurate" is conjectural; "furnish" or "decorate" is also possible.—Editor.]

⁶⁴ Cf. *SeSAF*, pp. 210-212.

119 bis—Grayish sandstone; broken into three fragments; photograph and squeezes.—T.S. 780 (Plate 118).

STONE 23.5 cm. at the bottom and 25 on the top × 10.5. INSCRIPTION: its location is defined by vertical and horizontal lines; letter height 4.5 cm.; space between the lines 0.7 cm.

1 *m'mr/twybm/d'mhṣn'm/w*
2 *bn/ṣwy'm/bṛṣjjm*

1 Votive offering of Tuwaybum, he of [the family] Muhaṣni'um and
2 of [the clan] Ṣuway'um, in Riṣāfum.

answers are sometimes all the more difficult because the problems are new in South Arabian.

a. The two statues were found outside the south wall of the House Yafaš, and probably were thus attached somewhere above, facing the South Gate.⁶⁵

b. The two statues faced each other⁶⁶ for they are cast that way. They were also probably close to each other, since they were so discovered.

c. The beauty of the two statues and the content of their inscription suggests that they were not used merely to flank some other more

precious object between them.⁶⁷

d. The most important question is the actual value of the two animals and their infant riders.⁶⁸ I consider these statues as a perfect illustration of the literary expression in the text Jamme 122/2: *dt/hmym/’itr/ygl*. Both in sculpture and text, the fundamental idea is the reunion of the two opposite realities, the strength of the male and the fertility of the female. The following scheme illustrates the perfect parallel which I recognize between the text and the statues.⁶⁹

JAMME 122/2

dt/hmym: sun-goddess
characterized by her strength in summer
time
mother of 'Attar
'itr: son of the sun-goddess
the strength is already indicated by the mane
itself,⁷⁰ underlined by the epithet *ygl*,
"avenger," quality which requires strength

THE STATUES

"the lions were solar animals."⁷¹

the strength is symbolized by the mane
the animals are actually lionesses
the infant riders

the dart or javelin in the hand of the riders

Because of Jamme 122/2, the two lionesses do not represent the rising and the setting sun,⁷¹ but on the contrary the summer and the winter sun. To the summer sun corresponds for 'Attar the epithet *nwfn*, "raised high, he who dominates."⁷²

The characteristics of the letters are, in general, their elongated aspect, and in particular, the flatness of *w*, formed of two small circles inscribed in an oval, and especially the almost circular swelling at the end of the strokes. There

is one difference between this inscription and that of A. M. 335.⁷³ In the latter, *d* has the usual form, while in the present text this letter is almost identical with the *t* in bronze inscriptions. The only difference between *d* and *t* is that the two curves of the *t* meet in a single point, while those of the *d* merge into one block for about one-third of the height of the letter.

The text completes our information on the part played by the man who became the owner of the House Yafaš. Tuwaybum inaugurated his house, and he associated with him a man whom the next text identifies as his son.

⁶⁵ Cf. loc. cit. (p. 210): "they had fallen there from a roof terrace."

⁶⁶ Cf. loc. cit.

⁶⁷ Cf. loc. cit.: "they were set up facing each other across a central object, perhaps an altar." Compare the bronze statue from Nahla el-Hamrā; the inscription (RÈS 4708 = Jamme 491) across the chest of the man states that there was another statue, and that both were connected with an incense sanctuary. The last item is not found in Jamme 120.

⁶⁸ Cf. SeS AF, pp. 211 B-212 A.

⁶⁹ Cf. [For another view, compare Dr. Segall in the preceding chapter.—Editor]

⁷⁰ Cf. loc. cit., p. 211 B and footnote 27. In Saba' the lion was a symbol of the moon-god 'Ilumquh (Cf. A. Grohmann, *Göttersymbole und Symboltiere auf südarabischen Denkmälern* (Vienna, 1914), pp. 67-70, 76).

⁷¹ Cf. commentary on Jamme 122/2.

⁷² Cf. SeS AF, p. 212 A.

⁷³ Cf. JaP, p. 88 and footnote 2, and JaRSAP, p. 265.

⁷⁴ Cf. Le Muséon, 62 (1949), Pl. II, between pp. 96 and 97; cf. also A. Jamme, "Les expéditions archéologiques," loc. cit., p. 140 and footnote 4.

121—Slab of micaceous quartzose schist covered with pinkish plaster and inscribed; intact; photograph and squeeze.
—T.S. 795. (Plate 119).

STONE 78 × 37.7 cm.; almost constant thickness 16 cm. INSCRIPTION: length of the lines 72, 71.8, 71.2, and 69.5 cm.; letter height 4.8, 4.8, 4.6, and 4.5 cm.; distance from upper border 6.3 cm. and from the lower 10.1 cm.; distance from the right-hand border 3.9, 3.2, 3, and 3.2 cm.; space between lines 0.7, from 0.8 to 0.9, and 0.7 cm.

- 1 'qrbm/bn/twybm/dmhṣn'm/wbn/šwy'm/br'w
- 2 swtr/h̄bs/yrš/wkl/ṣrhtsww/kls/glm/bhg
- 3 'nby/b'ṭtr/wb'm/wb/wifw/wb/dt/ṣntm/wbdt
- 4 žhrn/wb/mr's/ṣhr/ygl/yh̄gb/mlk/qtbn

- 1 'Aqrabum, son of Tuwaybum, he of [the family] Muhaṣni'um and of [the clan] Suway'um, has constructed and
- 2 put the foundation of his workshop Yariš and all its upper rooms, all together, according to the law of
- 3 'Anbay. By 'Aṭtar and by 'Amm and by Warāfū and by Dāt-Šantim and by Dāt-
- 4 Žahrān and by his lord Sahr Yagil Yuḥargib, king of Qatabān.

L. 1: 'qrbm: above the first two letters of this personal name, one can still see 'q, the beginning of the text, which the engraver, in his first attempt, had placed too high; the two letters were not erased. According to Jamme 119-121, Yaṣriḥ'amm is the father of Tuwaybum and grandfather of 'Aqrabum.

L. 2: yrš, well-known proper name; e. g., name of a house in CIH 614/1 (Sabaean).

The lettering of the text is definitely superior to that of Jamme 119, both as far as the finished appearance of the work and the precision of execution are concerned. All the characteristics of Jamme 119 can be found here. Moreover, the letters are slender and elongated; the relationship of height to width is about four to one. The horizontal stroke of ' , b , h , k , and š is a concave curve, that of ḥ is a convex line which is no less elegant. The central bars of d are still horizontal.

This text gives less details than Jamme 118 and 119, contains fewer verbs, and describes exclusively material actions related to a separate building. The final invocation contains the same divine names as that in Jamme 119. The royal name is no longer accompanied by the name of his father or of his uncle. Therefore, our text must be several years later than Jamme 119, because it was engraved during the period when Šahr alone occupied the throne. Finally, cf. the remarks on Jamme 119 concerning the god 'Il and the purely Qatabanian wording of the text.

122—Block of reddish sandstone, surmounted by a smaller one that served as stand for the bronze statue of a matron,⁷⁴ whose arms are broken; found in the house D.—T.S. 1120⁷⁵ (Plate 120).

FRONT OF THE LOWER BLOCK 26 × 17.3 cm.—INSCRIPTION: ⁷⁶ letter height 2.3 cm.; space between the lines 0.3 cm. Line 1 is 0.4 cm. from the upper border, 0.5 cm. from the left border, and 0.1 cm. from the right border. The last three letters of line 5 are engraved on the left side of the block.

	Front	Left side
1	b'rt/dt/byt/rṭd'l/bn/šhz/sq	
2	nyt/dt/h̄mym/'ṭtr/ygl/ṣlmt/d	
3	hbn/hgn/thrbts/lwsys/wwf	
4	y/dns/wmqms/wqny/sqr	
5	'm/drḥw/ršwt/'m/dd	ynt
6	bwrw'l/ḡyln/yhn'm/	

- 1 Bara'at, she of the house of Raqad'il of [the group] Saḥaz, has de-
- 2 dicated to Dāt-Himyām 'Aṭtar Yağul this female statue in
- 3 bronze according to what she attributed to Her for her [own] safety and the safe-
- 4 ty of her understanding (?) and her power and her property. [She was] procurator of
- 5 'Amm, He of Rabḥū [and] priestess of 'Amm, He of Daymat.
- 6 By Waraw'il Gaylān Yuhan'im.

L. 1: b'rt, cf. the personal names b'rt and br' in Thamudic⁷⁷ and br'm in Qatabanian (Jamme 195, and commentary).⁷⁸—dt/byt, cf. Jamme 360/1 and RÉS 4273/1; well-known expression indicating the relationship to a family.⁷⁹—šhz,

⁷⁴ Photographs are reproduced, e. g., by *SeSAF*, Pl. 61, Figs. 16, 17.

⁷⁵ Now in the Aden Museum.

⁷⁶ The front part of the text is reproduced by W. Phillips, *loc. cit.*, p. 174.

⁷⁷ Cf. *vdBrIT*, p. 230; Hu 710, and p. 462; Jsa 706, respectively; cf. E. Littmann, *Safaitic Inscriptions* (Leiden, 1913), p. 303 A, for references to Arabic, Greek, and Safaitic concerning the personal name br'.

⁷⁸ For G. Ryckmans: "br', Philby, dans *Journal of the Royal Asiatic Society*, 1914, p. 122" (cf. *Syria*, 30 [1953], p. 292), cf. *JadME*, p. 18.

⁷⁹ Cf. *JaPEHA*, p. 20, formula F, and A. Jamme, *Bulletin of the American Schools of Oriental Research*, no. 138 (1955), pp. 41-45.

also name of group in RÉS 3566/7 and 24, and 3854/10.⁸⁰

L. 2: *dt/hmym/itr/ygl*: *dt/hmym* means "she who darts forth her rays (?)"⁸¹ and *ygl*, "avenger (?)".⁸² The epithet *ygl* is not in keeping with G. Ryckmans' hypothesis according to which 'Attar was the god of irrigation and fecundity,⁸³ but is in perfect agreement with my view of the name '*itr*,⁸⁴ which I connect with Arabic '*attār*, "strong, brave, courageous"; this etymology is confirmed by the epithet '*zz (m or n)*, "powerful, mighty," e.g., in the unpublished Sabaean texts Jamme 559/18 and 631/20. The intimate association of the sun-goddess with her son the star is already mentioned in RÉS 4332;⁸⁵ the latter's being earlier than the lionesses and Jamme 122 indicates that the idea of assembling both sexes either in a sculptured or literary unity was not restricted to the last Qatabanian century B.C.—*slmt*, e.g., Jamme 350/3-4; this noun obviously refers to the statue of the lady, and is feminine.⁸⁶

L. 3: *hgn*, e.g., Jamme 347/3—*tkrbts*, cf. the masculine form *tkrbs*, e.g., in Jamme 334/2 and 340/2-3; cf. the commentary on the latter on the difference between *hgn* and *bdtm* (e.g., Jamme 334/2), both introducing the verb *tkrb*. The subject of the verb is Bara'at and the object is the divinity.

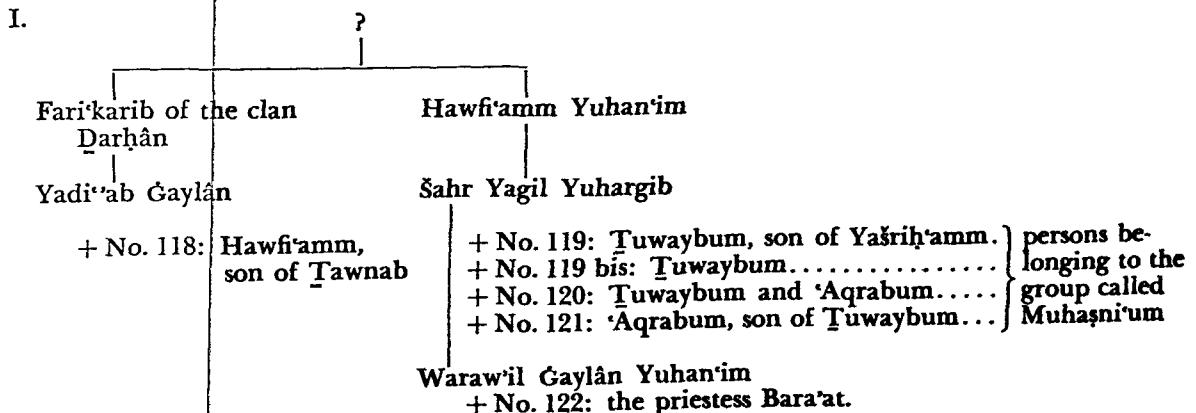
Ll. 3-4: *lwfy/.../wqny*: a similar expression is frequent in dedicatory inscriptions, and has various forms.—*dns/wmqm*, another frequently

used expression; cf. the commentary on the unpublished Sabaean texts Jamme 557 and 558/4.

Ll. 4-5: *qzrt 'm/drhw/rswt/m/ddynt*; *qzrt* and *rswt* are nouns and not verbs [for *rsw* as verb, cf. CIH 967/2, Sabaean] according to RÉS 3540⁸⁷/3-5: *qzr/..../m/tntm/shr./..../m/ry'n* (cf. also RÉS 3881/1). The parallelism of the preceding texts indicates the high social rank of Bara'at, for the second (and also RÉS 3881/1) is related to a *mkrb* "unifier."⁸⁸ For *rbhw*, cf. the group name *rbh* in Jamme 347/1, and more probably also in RÉS 3689/2 and 3692/2; for the form *rbhw*, cf. *nwrw*.⁸⁹ The above-mentioned quotation from RÉS 3540/3-5 excludes the possibility of a mistake, *w/* instead of */w.-ddynt*, cf. the Thamudic personal name *dwmt*,⁹⁰ and South Arabian '*m/ddwm* in RÉS 3566/4 and *wdm/ddwm* in RÉS 3958/6 (Sabaean).

The lettering of this text is almost identical with that of Jamme 121, with all its peculiarities. It marks a forward step in an evolution of script which seems to have reached its peak: the central strokes of *d* are slanting and the letters are even more elongated.

The preceding group of Qatabanian inscriptions gives valuable information on (I) the genealogy of several kings, (II) the history of House Yafaš, and (III) the development of South Arabian religion and its sculptural realization under Hellenistic influence.



⁸⁰ G. Ryckmans (*Les noms propres sud-sémitiques* [Louvain, 1934], I, p. 207 B) erroneously considers this name as personal.

⁸¹ Cf. *JaP*, pp. 102-106 and footnotes.

⁸² Cf. loc. cit., p. 39, and footnote 256.

⁸³ Cf., e.g., *RyRdP*, pp. 41, 62.

⁸⁴ Cf. *JaP*, pp. 83-86, footnote 229, and A. Jamme, in *Le Muséon*, 68 (1955), p. 317.

⁸⁵ Among the main palaeographical differences between Jamme 122 and RÉS 4332, I may mention the form of *t*,

the circles of *w*, *y*, *s* and *t*, and finally the middle part of *t*.

⁸⁶ Cf. also *HöASG*, e.g., p. 44.

⁸⁷ Cf. A. Jamme, "South-Arabian Inscriptions," loc. cit., pp. 510-511, no. 13.

⁸⁸ Cf. A. Jamme, "Quelques problèmes sud-arabes," *Bibliotheca Orientalis*, 12 (1955), pp. 219-220; contrast M. Höfner, *Archiv für Orientforschung* 20 (1956), p. 469 B.

⁸⁹ Cf. *JaP*, p. 100.

⁹⁰ Cf. *vdBrIT*, pp. 339-340; *JaP* 337.

II. Jamme 118: the House Yafaš probably goes back to a period preceding the time of the king Yadi'ab Gaylān, but during his reign the house was bought, built, and restored by Hawfi'amm, son of Tawnab.

Jamme 119: during the first years of Šahr Yagil Yuhargib, when his paternal uncle Fari'karib was governor, the house again changed ownership; three men (possibly three brothers), whose leader was Tuwaybum, son of Yašrīly'amm, purchased and secured title to the house.

Jamme 119 bis: Tuwaybum alone orders an *ex voto*.

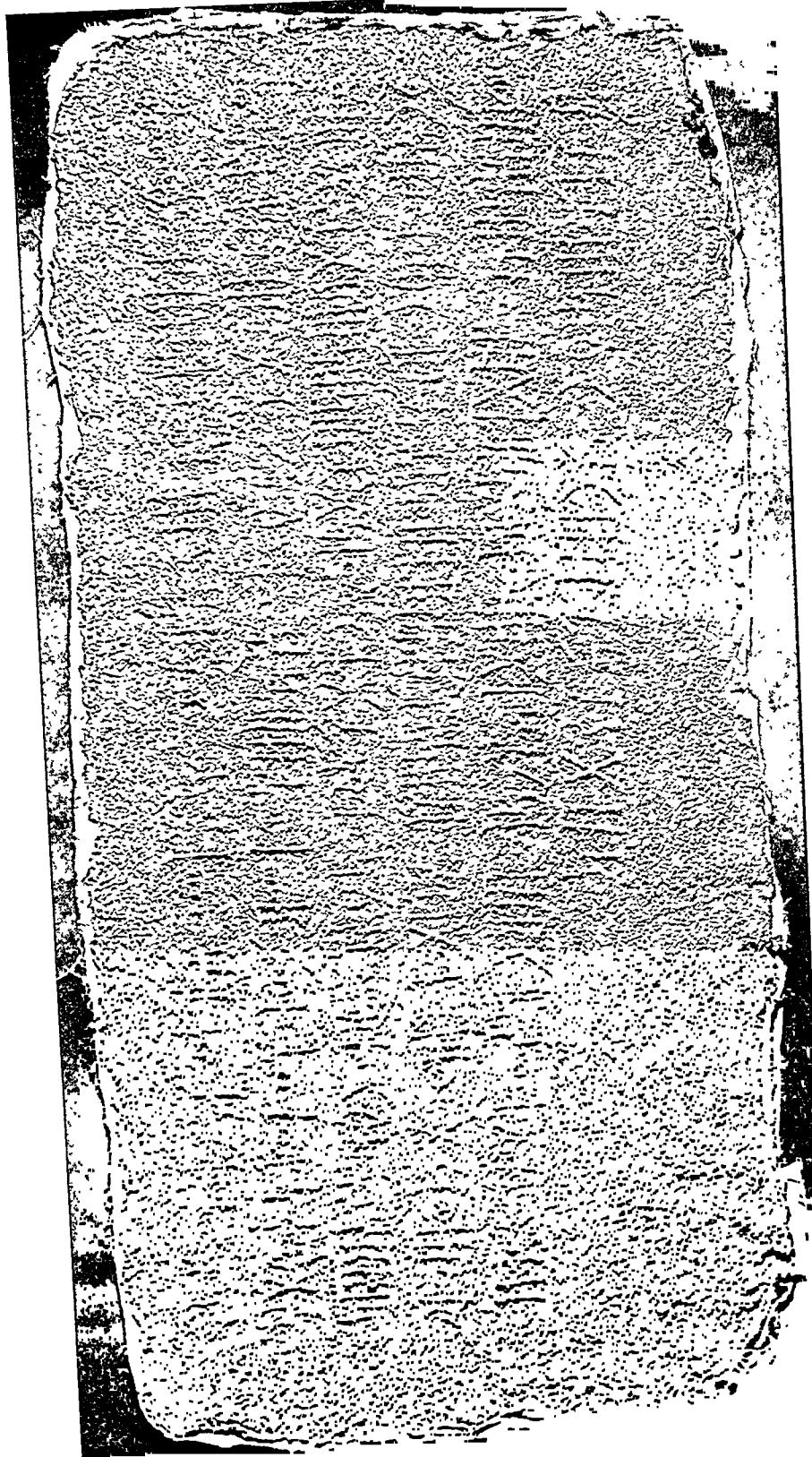
Jamme 120: later on, Tuwaybum and his son 'Aqrabum inaugurated the house, and this act was solemnized and recorded in two bronzes. The date of the text on the bronzes within the reign of Šahr Yagil Yuhargib is unknown. The mention of 'Aqrabum makes it possible to date

this text after the end of Fari'karib's governorship.

Jamme 121: during Šahr's reign and after both Fari'karib's governorship and Tuwaybum's death, 'Aqrabum, son of the latter, erected the workshop Yariš.

Jamme 122: during the reign of Waraw'il Gaylān, son of Šahr Yagil Yuhargib, the priestess Bara'at dedicated her own statue to the divinity.

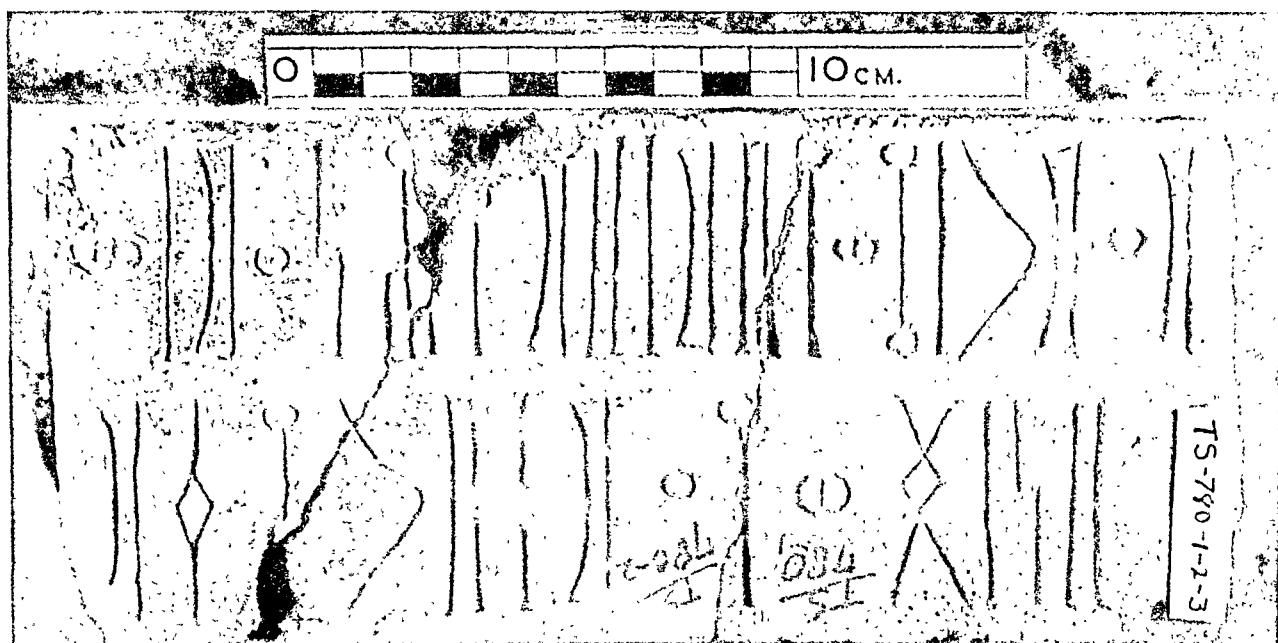
III. The comparison between Jamme 122/2 and the statues mentioned in Jamme 120 shows, in my opinion, that, on the one hand, the lionesses are symbols of the summer and winter sun-goddess and, on the other, the infant riders represent the star-god. These statues were commemorating the inauguration of the House Yafaš by Tuwaybum and his son 'Aqrabum, and at the same time intended to assure both secundity and protection.



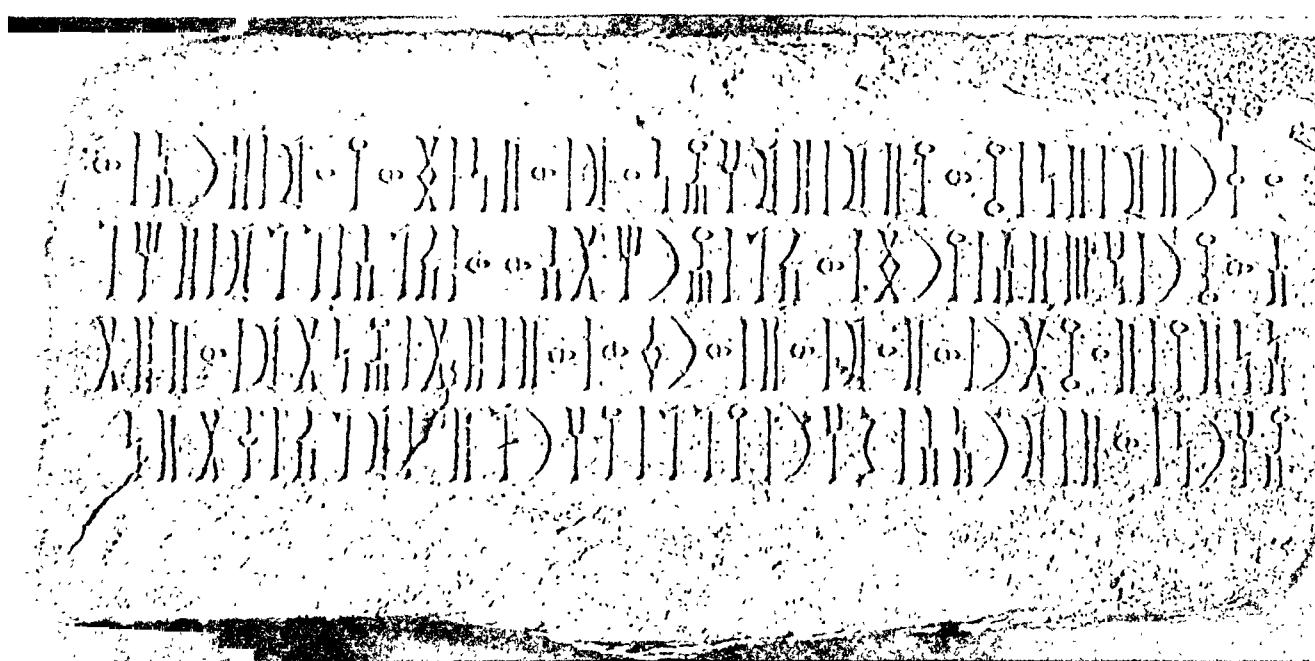
116. Squeeze (reversed) of T.S.m. = Jamme 118.



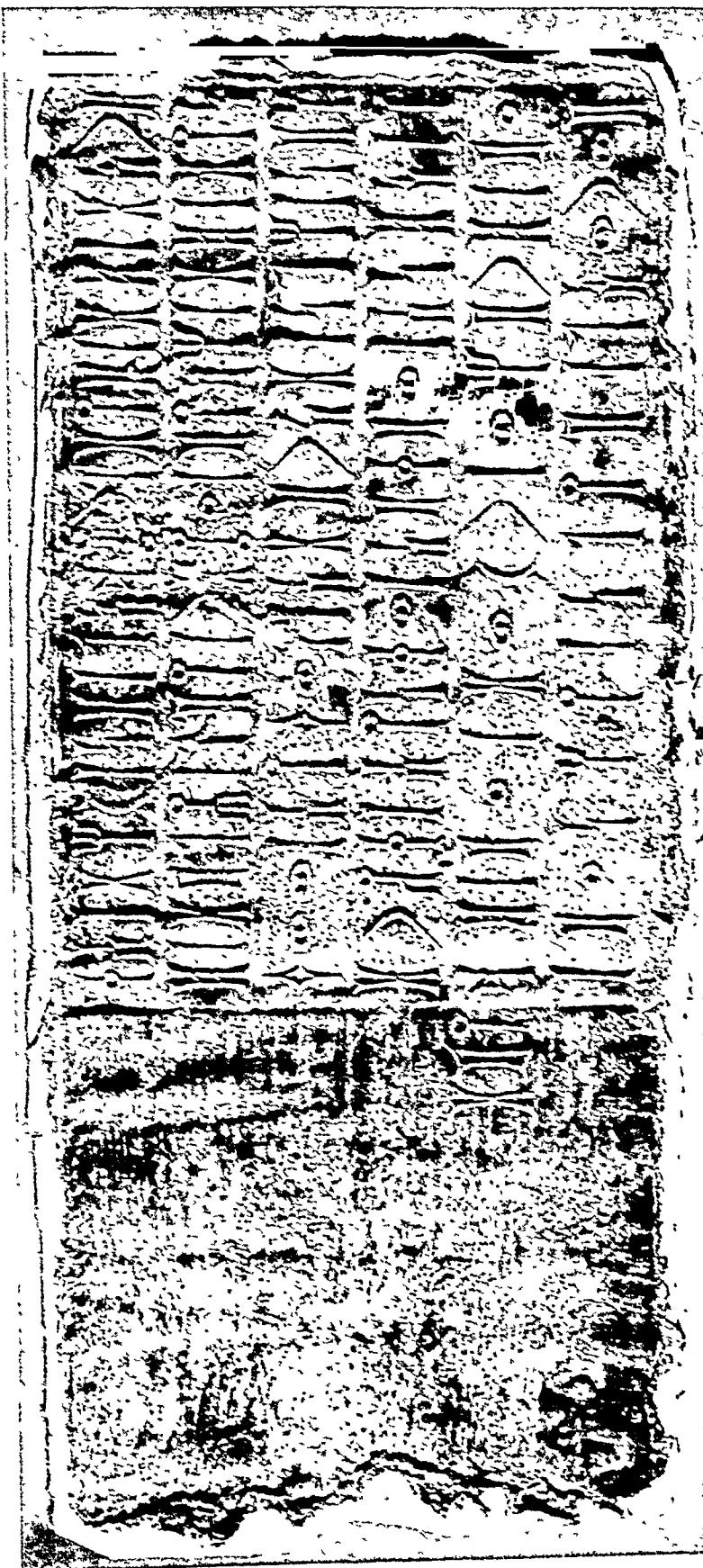
117. Squeeze (reversed) of T.S.ii. ≈ Jamne 119.



118. T.S. 780 = Jamme 119 bis.



119. T.S. 795 = Jamme 121.



120. Squeeze (reversed) of T.S. 1120-1 = Jamme 122.

IMPORTED POTTERY AND GLASS FROM TIMNA¹

Howard Comfort

The publication of Wendell Phillips' *Qataban and Sheba* (New York, 1955), together with the periodical articles dealing with Timna^a by W. F. Albright and others,¹ dispenses with the need for detailed description of the provenance of the items here discussed. Timna^a (the Thomna of Pliny the Elder) was the capital of the Qatabanian Kingdom in southwest Arabia, now partly in the Kingdom of Yemen and partly in the Aden Protectorate; the inhabitants were middlemen and caravaneers in the incense trade; they had access by camel to the south coast of Arabia across mountains mostly impassable by truck today, as well as to the Mediterranean; they trafficked with whatever Levantines conducted the western end of the incense route, but apart from the pottery and glass there is no evidence of any sort of *conventus Romanorum* in Timna^a itself,² though there is epigraphic evi-

¹ W. F. Albright, "The Chronology of Ancient South Arabia in the Light of the First Campaign of Excavation in Qatabān," *Bulletin of the American Schools of Oriental Research*, no. 119 (1950), pp. 2-12; G. W. Van Beek, "Recovering the Ancient Civilization of Arabia," *Biblical Archaeologist*, 15 (1952), pp. 2-18; W. F. Albright, review of J. Ryckmans' *L'Institution monarchique en Arabie Méridionale avant l'Islam*, *Journal of the American Oriental Society* 73 (1953), pp. 36-40; Berta Segall, "Sculpture from Arabia Felix, The Hellenistic Period," *American Journal of Archaeology* 59 (1955), pp. 207-14. See also C. Rathjens, "Kulturelle Einflüsse in Südwest-Arabien von den ältesten Zeiten bis zum Islam," *Jahrb. f. Kleinasiat. Forsch.*, 1 (1950), pp. 1-42; H. von Wissmann and Maria Höfner, "Beiträge zur historischen Geographie des vorislamischen Südarabien," *Abhandl. d. Ak. d. Wissenschaften u. d. Literatur in Mainz*, Geistes- und Sozialwiss. Kl. (1952), Nr. 4.

² At other sites outside the Empire, Roman pottery presumes some immigrant "Romans" to use it. But arguing in part from Aelius Gallus' unfortunate experiences with his guides in 24 B.C., in part from their own experiences of xenophobia in Yemen in 1951-52, and in part from other considerations, the excavators feel the burden of proof to rest on those who would assume a "European colony" at first-century Timna^a.

dence of Arameans; it is hence inferred that the natives of Timna^a themselves were *studiosi rerum novarum* rather than that immigrating "Romans" brought their own familiar house-furnishings with them, and the names of house-owners where the following objects were found point in the same direction. Timna^a lay some distance beyond the limit reached by Aelius Gallus; the kingdom was on bad terms with its neighbors, who ultimately destroyed it. The first question is, When?

The most manageable evidence on this point, as at Virampatnam-Arikamedu in India, is the imported Roman Arretine ware of which the chronology is determined by correspondences with the Augustan military sites in Germany, especially at Haltern.³ Two problems beset the

³ Note that in both ancient and modern times "Arretine ware" is a generic name for the high-grade lustrous red-surfaced terra sigillata of Italy which was made not merely at Arretium (Arezzo), but also at other centers both in the peninsula and elsewhere in the Empire. A. Oxé, "Die Halterner Sigillatafunde seit 1925" in Stieren, *Bodenaltertümer Westfalens*, 6 (1943 [1944]), 67, shows that only 16 per cent of the "Arretine" stamps at Haltern are Italian at all, and only slightly more than one-half of these were manufactured at Arezzo itself. Furthermore, preliminary experiments made by Drs. E. V. Sayre and R. W. Dodson at the Brookhaven National Laboratory during the spring of 1956 and reported as "Neutron Activation Study of Mediterranean Potsherds" in *American Journal of Archaeology*, 61 (1957), pp. 35-41, now suggest special reserve in the assignment of Italian sigillata origins. Stated briefly and nontechnically, a workable normal "manganese to sodium quotient" has been established for eight genuine signed Arretine fragments presumably made at Arezzo and found at Rome (although for some unexplained reason one of the group does not conform to the other seven), while the corresponding quotients for five of the fragments of Italian sigillata from Timna^a (including no. 2 from the shop of Perennius!) are more or less bunched together in a substantially lower range! It is too early to draw conclusions from this apparent discrepancy between the Arretine of Arezzo and the "Arretine" of Timna^a, but tentatively one must sup-

application of the German evidence to southwest Arabia: (1) Is the cutoff date at Haltern A. D. 9 (so Loeschcke and Kraft) or 16 (so Oxé)?⁴ and (2) What was the time lag of Italian sigillata reaching Germany and Timna' respectively? The first question cannot be argued here, though it is crucial for the precise date of Timna's destruction; I have somewhat arbitrarily followed Kraft as being the most recent critic and on that basis propose A. D. 10 rather than six years later as the critical round date for Timna'. As regards the second question, while transport northward or eastward from Italy cannot have been instantaneous, Professor Albright is doubtless correct in suggesting that, given the constant back-and-forth caravan traffic from Timna' to the Mediterranean and South Arabian coasts, the time lag to Timna' may have been virtually negligible. As a working hypothesis, the Haltern timetable, such as it is, is accepted for Timna'.

In addition to Italian sigillata, Timna' also yielded small quantities of miscellaneous other Roman-period pottery and two pieces of glass—hardly a solid basis for any precise chronology.⁵ However, it is at least noticeable and perhaps significant that such familiar categories as the Hellenistic "Pergamene" ware and the molded "Megarian" bowls, pre-Arretine Campanian ware, the earlier phases of Arretine ware itself, Julio-Claudian Italian and South Gaulish

pose that: (1) the "Arretine" ware exported to Timna' (and if to Timna', then presumably also to other parts of the Near East, and perhaps also to the West and North, as Oxé has shown on other evidence) was in large measure not strictly Arretine at all, but was made elsewhere in Italy contemporarily, with all the implications of commerce that this hypothesis suggests; or (2) the basic ratio of manganese to sodium upon which the quotients are calculated is altered by the circumstances and localities of preservation; or (3) the same potters that worked at Arezzo also worked elsewhere in Italy with similar but chemically distinguishable clays. And there are other possibilities. It is too early to pronounce judgment; for the moment we merely express the caution noted above.

⁴ S. Loeschcke, *Mitt. aus Westfalen*, 5 (1909), esp. pp. 103-190; K. Kraft, "Das Enddatum des Legionslagers Haltern," *Bonner Jahrb.*, 155/156 (1955/56), pp. 95-111; Oxé, *op. cit.*, esp. pp. 68-69. Kraft's chronological conclusion rests on comparison of numismatic evidence from Haltern, Oberhausen, and Vindonissa; he also questions the usual over-all identification of Haltern with the Roman camp Aliso.

⁵ An interesting and important Hellenistic pedestal crater with figures in relief on the outer wall, of uncertain connections, and a few other glazed or faience fragments are omitted from the present group and will be published elsewhere.

sigillata, and Nabatean ware are completely lacking, while "Roman Pergamene" ware and "Samian" fabrics are represented by only one survivor apiece. Timna' had prospered on foreign trade long before the principate of Augustus, and possibly for a time afterward, but this trade has left few traces of ceramic imports from the Mediterranean world.

To anticipate the examination of the evidence, in which fragments 7 and 10 are especially significant, Timna' was not destroyed until A. D. 10 or thereafter—perhaps not until substantially thereafter. A more precise date may be contributed by epigraphic, dynastic, and general historical considerations to be studied by others.⁶ But at least we can state that Timna' survived most of the principate of Augustus.

In more ways than one, Timna' cannot be considered apart from Virampatnam-Arikamedu.⁷ In the first place, despite certain striking differences, the Roman phases of the two sites appear to be about contemporary with the later phase of Haltern, say from 0 to A. D. 15±. Typologically the Arretine cups, plates, and relief-decorated bowls at the two sites show as much similarity as could be expected, and if we knew more about the two Arretine fragments from Chandravalli (Chitaldrug District) which were accompanied by a pair of denarii of Tiberius and some imported rouletted black ware of Arikamedu Type 1,⁸ we should doubtless find that they conform to the same pattern. Further, five or six glass bowls like no. 18 below were found at Arikamedu.⁹ On the other hand, the finds at Timna' include only two Mediterranean amphorae and none of the imported rouletted black plates of Arikamedu Type 1, both of which are common at Arikamedu before, during, and after the Arretine period.¹⁰ Furthermore, hard grayish buff

⁴ For instance, J. Pirenne (*Le Muséon*, LXIX, 1-2 [1956], pp. 180 f.) dates the fall of Timna' about A. D. 250 on inscriptive evidence. However, none of the ceramics that I have seen would support anything as late as that.

⁵ R. E. M. Wheeler, "Arikamedu: an Indo-Roman Trading Station on the East Coast of India," *Ancient India*, 2 (1946), pp. 17-124; J. M. Casal, *Fouilles de Virampatnam-Arikamedu* (Paris, 1949); L. Ohlenroth, "Zur Datierung der Funde von Arikamedu," *Germania*, 30 (1952), pp. 389-92.

⁶ Wheeler, *op. cit.*, p. 48.

⁷ Wheeler, *op. cit.*, p. 102.

⁸ This latter fabric is a mystery. Wheeler recognized it as an importation; Casal compared its roulettings to those of Campanian ware (Pl. XVI), and even more convincing parallels with various Mediterranean fabrics could

polished cups imitating Haltern Form 12, less common at Arikamedu,¹¹ are wholly lacking at Timna'. Conversely, the non-Arretine ceramics of Timna' are not found at Arikamedu. But while these differences are striking, they are no greater than those found between comparable contemporary centers within the empire itself; it is the similarities that are suggestive.

In the second place, both Timna' and India lay on the same general trade route. This is not the place to review Roman commerce with the Orient, but Arikamedu instructs us that before the local "Arretine period"—say in the early part of Augustus' principate—there was already commerce with the Mediterranean, and that by a slightly later time, at the latest, precious and semiprecious stones and dyed muslin were being sent from India to the Mediterranean. India also exported pepper. The list of finds of Roman coins in India¹² similarly shows graphically how payment for these commodities was made through the well-known generous outpouring of gold and silver bullion, especially around Coimbatore in the saddle leading from the west coast to the east coast of south India. But Arikamedu and citations from "very insecurely dated" Tamil literature further indicate that wine (and oil?) were also imported from the Mediterranean to India, and that in India Greco-Roman "Yavanas" were a thoroughly familiar sight as successful resident merchants, and as mercenaries, engineers, and mariners.¹³

At a different but not unrelated compass point we see something of the same trend contemporaneously at Seleucia-on-the-Tigris, where an "Arretine" stamp, IAΛΛΑΡΙV-SFECI, written circularly around a cross, implies a late Augustan or early Tiberian date.¹⁴ It was one of "a considerable number of fragments" of Arretine ware¹⁵ which, when more completely published, may give a picture resembling that of both Virampatnam-Arikamedu and Timna', though it

be illustrated; it is absent from Antioch, Tarsus, and other Augustan sites known to me.

¹¹ Wheeler, *op. cit.*, pp. 10-11; Ohlenroth surmises they could be genuine Arretine and notes that they are in any case Augustan (*op. cit.*, p. 392, note 21).

¹² Wheeler, *op. cit.*, pp. 116-21, with distribution map.

¹³ Wheeler, *op. cit.*, pp. 19-21.

¹⁴ H. Comfort, "Supplementary Sigillata Signatures in the Near East," *Journal of the American Oriental Society*, 58 (1938), p. 51.

¹⁵ N. C. Debevoise, *Parthian Pottery from Seleucia on the Tigris* (Ann Arbor, 1934), p. 22.

must be admitted that photographs of the red-surfaced ware from Seleucia, kindly furnished by the Kelsey Museum of Archaeology of the University of Michigan, lend less support to such a theory than might have been anticipated.

To return to Timna', it goes without saying that Roman contact with the Qatabanians responded principally to incense and cosmetics, not to pepper, jewelry, and muslin. But increased activity on the route to India could not help influencing southwest Arabia, and one cannot escape the conclusion that a good deal of the Italian sigillata at Timna' came to Arabia by sea, with or without Yavana emigrants accompanying it. Employing a convenient fallacy, we may reason that since Italian sigillata and glass reached Arikamedu by a sea voyage, they therefore reached Timna' by the same sea voyage as far as the southwest Arabian coast; but that since eastern Mediterranean wares did not reach Arikamedu at all, these wares therefore reached Timna' by a different route altogether, i. e. by caravan from some south Palestinian emporium. Such schematization, despite the hypotheses involved, may nevertheless offer a framework for profitable speculation.

To what extent do the excavations at the south gate, the temple, and the cemetery of Timna', upon which we depend for evidence, present a cross section of life and culture in the city and kingdom? According to Pliny, *Nat. Hist.* 16. 1. 19., and Dr. Segall,¹⁶ they give only a partial picture, that of the nobility and affluent merchants, not of the urban rabble or of the farmers. More important, to what extent do the finds represent private life and household furnishings at the time of the destruction? We propose A. D. 9 as a *terminus ante quem non* for the cataclysm, but this involves suggesting in effect that during the preceding five or ten years the wealthy strata of the population had, without much warning except an addiction to Hellenistic sculpture, suddenly enlarged their cultural horizons and taken to the hasty importation of sophisticated tableware from the Capital and the Hellenistic East.¹⁷ This is of course possible, and might be attributed in part to the contemporary increase in India-bound transient marine

¹⁶ See note 1, above.

¹⁷ The suggested interval for the commencement of importation assumes that the ACO beaker (no 1 below) can be later than 10 B.C.

traffic. But it does not account for everything—for instance, the green-glazed ware. Further, while I see nothing in the present lot that could not have reached Timna' by A. D. 9, in some cases one must invoke an almost unseemly haste to deliver it thither in time for destruction. On the other hand, there is a good deal that could fit without strain into a Tiberian context, or even later, especially the Near Eastern items. It is possible that Arretine import to Timna' ceased at the same time and for the same reasons, whatever these were, that it ceased to Arikamedu; and that Timna', like Arikamedu, continued a prosperous existence for a few years during which it used Near Eastern tableware. But at this point the lack of evidence places a truce upon theorizing, and we turn to the more detailed examination of the sherds.

I. ACO-Ware

1. (TC-1837). ACO-ware is so-named from its principal manufacturer, who flourished in the Po Valley or elsewhere in North Italy. The present fragment from Timna' is highly characteristic: hard, thin, brownish-gray ware, mold-made on the exterior and wheel-sponged or the like on the interior. At the upper edge of the exterior, as preserved, there is a horizontal row of almost unrecognizably minuscule human heads facing right, and the remainder of the surface is filled with small elongated triangles in relief, arranged in diagonal rows, well christened a "Komma-Regen" by Oxé (Plates 121, 122).¹⁸ A more complete duplicate of this head-and-comma decoration, perhaps from the identical mold, signed BJVCCIO [NORBANI] and carrying an upper border of leaves, was found at the Magdalensberg in Austria, where it has been assigned to the earlier decades of Augustus' principate; other specimens of the ware have been found in greater or less concentrations elsewhere in Austria, at Oberaden (11-8 B. C.) and sites along the lower Rhine, fairly widely in Gaul, at Ampurias, and of course in northern Italy.¹⁹ From a photograph of our piece Dr.

¹⁸ So far as I know, Plate 122 is the only published photograph of the characteristic interior surface of this ware.

¹⁹ The Magdalensberg sherd, H. Kenner, *Carinthia* 1, 142 (1951), p. 54, Fig. 33; other ACO-ware from the same

Ludwig Ohlenroth has been good enough to comment that "dieser ACO-Becher ist typisch für die früheste Gruppe und für die fröhlaugsteischen Kastelle wie Neuss, Oberaden, Xanten und die Oppida Bibracte und Gergovia." Only one ACO-vase, not yet published, has been found at Haltern; perhaps the ware ceased to be imported *into the Rhineland* about 10 B. C.²⁰

Oxé, supposing that the ware was too fragile for transport to long distances from its place of manufacture, postulated a Rhenish or Gallic factory of Aco in addition to the North Italian. His theory is substantially weakened by the discovery of an ACO-beaker at Askalon, Palestine,²¹ and by the present sherd from Timna', surely distant enough from North Italy to satisfy the most exacting.

If we can explain away the evidence of the Aislingen and Tongres sherds, and if there was no time lag in the importation of this piece to Timna', and even if it was among the last pieces made by Aco or Norbanus, it may well be the earliest Italian ceramic evidence at the site. If, on the other hand, the Aislingen sherd is contemporary with the founding of Aislingen in the middle years of Tiberius²² or nearly so, and if the chronology of the beaker from Tongres is

site in preceding and following numbers of the same series; considerable material collected by J. Déchelette, *Vases céramiques ornés* 1 (Paris, 1904), pp. 31-41, and by Oxé in Albrecht, *Oberaden* 1, p. 47; other references scattered throughout the literature, and much unpublished.

²⁰ However, 10 B. C. is too early for a complete cessation of the manufacture of ACO-ware. It appears later in the principate of Augustus at the Magdalensberg (Vetters in *Carinthia* 1, 146 (1955), p. 23, and by letter), and evidence of still longer survival comes from Aislingen (R. Knorr, *Jahrb. d. hist. Vereins Dillingen*, 25 (1912), p. 67, Pl. xv 1): "Untere Hälfte eines Bechers aus sehr hart gebranntem bräunlichrotem sigillataartigem Ton; der dekorierte Teil ist aus einem Modell geformt," with the same "rainstorm of commas" descending to the foot of the beaker in triangular panels. Leaving aside the tribulations of Aco and his contemporary Norbanus, and the innovations of their successor L. Sarius, as reconstructed by Loeschke (*op. cit.*, pp. 162-63), all of which require re-evaluation in the light of more modern evidence, chronologically the Aislingen sherd cannot vary too widely from the "übrigen Aislinger Sigillatafunden, von welchen kein Stück weiter zurückreicht als in die Zeit des Tiberius." And a red-surfaced ACO-vase of more elaborate decoration, from an almost exclusively post-Augustan context at Tongres, points in the same direction (P. de Schaetzen and M. J. P. Vanderhoeven, *Bull. de l'Inst. archéol. liégeois*, 70 (1953-54), p. 11, Pl. 1 1-1a).

²¹ J. H. Iliffe, "Sigillata Wares from the Near East," *Quarterly of the Department of Antiquities in Palestine*, 6 (1939), pp. 20 ff.

²² Knorr, *op. cit.*, p. 1.

what its context implies it to be, then we risk losing our principal solid evidence for any importation from Italy to Timna^c before the later years of Augustus, and the mean date for such importation descends to that of Haltern's destruction and, more significant, to that of Vrampatnam-Arikamedu or even later.²³

II. Italian ("Arretine") Sigillata

2. (TC-976). Fragment of a vase decorated in molded relief, made at Arezzo in the shop of either M. Perennius Tigranus or M. Perennius Bargathes (Plate 123). Parts of three figures are preserved: (1) a seated female lyre-player; (2) a standing female playing another type of lyre; and (3) a seated male figure playing a double flute and beating time on a *scabellum* with his foot.

All of these figures are already familiar through occurrence on other vases. The seated harpist and the flute-player appear on a vase by Tigranus' "Meister mit den Zahnlücken" (so Oxé;²⁴ less imaginatively but more viably rechristened Tigranus-A by Dragendorff), which was found in the Augustan camp on the Fürstenberg near Xanten and is dated 10 b. c. The standing harpist and the flute-player are found together on another vase by the same Meister,²⁵ presumably from about the same date, and they appear together as well as separately on other vases by Perennian potters including M. Perennius Bargathes.²⁶ This latter pottery-master may or may not have overlapped with Tigranus and his troupe, but at least his *floruit* was later than that of Tigranus; it is uncertain precisely when the one declined and the other emerged. Though the works of the Tigranus-A Master are obviously later than those of the earliest and best of Ti-

²³ Ohlenroth, "Zur Datierung der Funde von Arikamedu," *Germania*, 30 (1952), pp. 389-92.

²⁴ Oxé, *Arret. Reliefgefäß vom Rhein*, pp. 41 f. and Pl. II. The same harpist appears on a mold for a very similar bowl by the same Meister; C. Alexander, *Corpus Vasorum Antiquorum*, Met. Mus., I (Cambridge, 1943), Pl. XXXIX 4.

²⁵ Oxé, *op. cit.*, Pl. XXVIII 120.

²⁶ Oxé, *op. cit.*, Pl. LXIV 155b. In this example, and in others figured by H. Dragendorff-C. Watzinger, *Arretinische Reliefkeramik* (Reutlingen, 1948), the swing of the harpist's dress falls over her shoulder all the way to the ground; but it is still the same figure with only the abbreviation of the garment.

granus' artists, and though they represent a time when the original contexts of such figures as ours were forgotten or neglected and when the figures themselves could be combined into new orchestral ensembles, nevertheless they were rather sharp in outline and delicate in execution. On admittedly subjective grounds, I feel that our sherd is later in style and execution than the A-Master's work. Perhaps it belongs in the first decade after Christ.

3. (S-47). A segment of the foot and adjacent parts of the horizontal bottom of a plate (Plate 124). The foot is triangular in section. On the upper surface, above the foot, there is the customary rouletted band between incised circles. This piece has no chronological significance outside the limits imposed by other fragments.

4. (S-6). A less complete fragment like the preceding (Plate 125).

5. (TTI-451). A fragment of the foot and adjacent parts of a plate, differing from no. 3 only in the absence of rouletting (Plate 126).

6. (No no.). A fragment of the flat bottom of a plate; foot and rim lacking (not illustrated). Like the three preceding, it has no chronological significance.

7. (TS-898). A fragment of the rim of a plate of Haltern Form 3, with a quarter-round molding between the vertical rim and the flat bottom (Plates 127, 128). One, and only one, example of this profile appears at Haltern (unsigned), but it is a weak curve in comparison with ours and with other later specimens. After the Haltern period this kind of plate became quite common, appearing in conjunction with stamps in both a rectangle and *planta pedis*.²⁷ It is unfortunate that the Timna^c sherd does not include the signature; as matters stand, we can only say that it competes with no. 10 below for the distinction of being the latest Roman ceramic evidence at the site.

Oxé dates the emergence of this form just before the abandonment of Haltern,²⁸ and the Timna^c plate can hardly be earlier, although it could be later.

8. (TS-955). A fragment of the rim of a cup

²⁷ For an example of the latter from the Near East, cf. F. O. Waagé-H. Comfort, *Palestine Exploration Fund Quarterly Statement*, 68 (1936), Pl. I, stamped *Camuri* in *planta pedis*, from Beth Shan.

²⁸ Bodenaltert. Westfalens, 6 (1943), p. 70; as noted above, p. 200, we date this event in A.D. 9.

of Haltern Form 8; good thin work, well profiled, neatly rouletted above and below (Plate 129). It exactly corresponds to Oxé's description of the form as found at Oberaden before 8 b. c.: "senkrechte, schön profilierte Rand, in der Mitte von einem straffen Band umspannt, darüber und darunter gestrichelt."²⁹ This fragment thus might be as early as 8 b. c., but it could also be later. As a *terminus post quem* for Roman importation, the ACO-beaker (if interpreted traditionally) retains its value.

9. (TS-1017). A fragment of the bottom of a small cup of Haltern Form 8; foot and signature both lacking (Plate 130). Like nos. 3-6 above, it is consistent with other chronological evidence from Timna'; but makes no unique contribution of its own.

10. (No no.). A small fragment which might be the upper part of the wall and the barest commencement of the rim of another Haltern 8, but which seems more probably to be the corresponding part of Haltern Form 15, a small cup with the bottom flaring outward from a ring-base to a carination above which the sides rise vertically (Plates 131 and 132).³⁰ Over its whole history this latter shape shows considerable evolution of detail; but since the carination is the only part preserved on the Timna' sherd, we may neglect the varieties of foot, rim, and decorative appliqué on the exterior of the vertical wall. What is important to us is (1) the use of rouletting (2) on a small string-molding (3) which apparently did not protrude noticeably from the profile of the cup at that point, since many other examples either omit the molding altogether or else exaggerate it as a strongly marked ledge, and sometimes omit the rouletting.

The shape appears in large and small sizes at Haltern; three examples are unsigned and three are signed *Atei*, *Optatus*, and *Xanti*, respectively.³¹ That is all. But Form 15 is not intrinsically such a rarity; it is merely rare at Haltern, presumably because its emergence was contemporary with the last period of the camp.³²

²⁹ Albrecht, *Oberaden* 1, pp. 41 f.

³⁰ The ensuing discussion assumes that the latter is the correct identification of the form; but even in the opposite case our proposed date for the end of Timna' remains as securely pegged on no. 7 as if it had the confirmation of a contemporary fragment of Haltern 15.

³¹ Loeschke, *op. cit.*, p. 155; K. Hähnle, *Mitt. aus Westfalen*, 6 (1912), p. 40; Oxé, *Bodenaltert. Westfalens*, 6 (1943), pp. 18, 22.

³² Oxé, *op. cit.*, p. 74.

The most convenient parallel to the Timna' sherd is a complete cup now at the University of Pennsylvania Museum, signed AV[CT]VS and C [ANN]I illustrated for comparison in *Antioch* iv 1, Pl. xii 20. It has a rouletted, non-protruding string-molding; further, the name occurs a pair of times at Haltern. Other parallels to the shape could be cited, but I know of none demonstrably earlier than A. D. 10, though many are demonstrably later, for instance those at Carnuntum.³³

Auctus C. Anni was a true Arretine, but to judge by the signatures appearing on it, Form 15 was more popular among Italian potters elsewhere than at Arezzo.³⁴ Even apart from the considerations noted in footnote 3 above, there is a fair chance that this particular fragment is not strictly Arretine, but was made somewhere else in Italy.

III. Near Eastern Sigillata Wares

11. (TC-132). Bottom and ring-base of a cup or bowl of "Roman Pergamene" ware (Plates 133, 134). The clay, which is orange-red rather than the shades of buff and red-brown which had been prevalent in the "Hellenistic Pergamene" period, continues to be fine and well levigated. The varnish is thinner and more matt than before, but it still covers the entire vase; blotches around the base, which might be finger-prints, are common on this ware and appear on our specimen; cf. Plate 134. The date of this piece is consistent with other ceramic evidence from Timna'; though it could be later than the first quarter of the first Christian century, it could also fall as early as A. D. 10.³⁵

12. (TS-955). Of this piece (Plates 135, 136) Professor Henry Robinson kindly writes:

The fragment is Samian, of the type I have called 'Samian B,' the better quality of Samian

³³ E. Nowotny, *Der römische Limes in Österreich*, 12, cols. 167 ff.

³⁴ F. Wiesinger, *Carinthia* 1, 131/132 (1941/42), p. 89, lists 31 instances in the Klagenfurt Museum, mostly of North Italian manufacture. The proportions of stamps are significant: 7 in a rectangle against 21 in various forms of *planta pedis*.

³⁵ Miss Frances Jones has been good enough to examine this piece; for full description of the ware and for relevant bibliography, see her discussion in Goldman *et al.*, *Excavations at Gözlü Kule, Tarsus* 1 (Princeton, 1950), pp. 181 ff.

ware, which was made probably no earlier than the turn of the era and may have had a life of no more than thirty-five or at the most fifty years. The poorer grades of Samian ('Samian A') had a much longer life, its latest types going down into the second century. The clay of the Timna' fragment is certainly not micaceous—and the mica-content is one point which has been considered significant (almost typical) for the ware. However, the color of clay and glaze, the shape of foot (with groove at inner edge of resting surface) and the style of the stamp and lettering clearly associate the piece with 'Samian B' ware. The stamp is puzzling. I read, as you do, ΕΩΝ|TOY; the word should represent a potter's name in the genitive, but ΕΩΝΤΟC is not known to me as a Greek name. It does not seem impossible that your stamp might stand for [Λ]ΕΩΝ|TOY.

Not impossible, perhaps; but the reading is far from unassailable, and Λεύτης or Λέυτος is not attested in any onomasticon or index available to me. No alternative initial to Λ improves matters, but actually there is no reason except despair at the visible text for supposing that any initial letter is missing at all.²⁷ Nor does reverting the order of the lines help, as in some cases. Yet sheer nonsense is not characteristic of these stamps, as it is of some other ceramic inscriptions, and an acceptable reading may some time be provided. Our piece is thus exceptional in two respects: the usual mica is absent from the paste, and the inscription, which has defied more complete reading than that originally proposed by Professor Albright, is tentatively unique. Yet the other criteria compel us to accept the ware as Samian B, with the chronological implications noted above, which are consistent with the chronology we propose for the destruction of Timna'.

IV. "Thorn" Ware

13. (TC x 10.) A fragment of *guttæ* ("thorn" ware (Plates 137, 138). Undecorated wares in "dove" and "gutta" styles respectively, seem to be mixed. The *guttæ* is as

²⁷The feminine form Λεύτης seems a possibility, but in the Institute for Advanced Study, where I have seen Athenian inscriptions from the same period, Λεύτης is Λεύτης or Λεύτησις, *i.e.* Λεύτης, Λεύτησις, Graecae XII 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 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2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3049, 3050, 3051, 3052, 3053, 3054, 3055, 3056, 3057, 3058, 3059, 3059, 3060, 3061, 3062, 3063, 3064, 3065, 3066, 3067, 3068, 3069, 3069, 3070, 3071, 3072, 3073, 3074, 3075, 3076, 3077, 3078, 3079, 3079, 3080, 3081, 3082, 3083, 3084, 3085, 3086, 3087, 3088, 3089, 3089, 3090, 3091, 3092, 3093, 3094, 3095, 3096, 3097, 3098, 3099, 3099, 3100, 3101, 3102, 3103, 3104, 3105, 3106, 3107, 3108, 3109, 3109, 3110, 3111, 311

but it appears to resemble *Tarsus* nos. 617 and 618 (Figure 150). The "thorns" are like those of these two pieces and Figure 150B, but less regularly disposed.

V. Lead Glazed Ware

Hellenistic lead-glazed pottery, especially of the kind represented by our no. 14, was found at Tarsus and has been discussed by Miss Jones.⁴⁰ It is established that the ware was made in South Russia, at Tarsus, and in North Syria in the first Christian century and perhaps as early as the latter half of the first century B.C.; some local schools and peculiarities have been observed. Miss Jones's representative list of South Russian and Levantine provenances in the *American Journal of Archaeology*, 49, is interesting; amazingly, it contains no entries from Athens or Alexandria, and it alludes to only "rare" instances at Antioch.⁴¹ A general study of all known pieces would be helpful.

The three fragments from Timna' (no. 14 = Plates 139, 140; no. 15 = Plate 141; no. 16 = Plates 142, 143),⁴² though forming a group, differ from each other in shape, clay, decoration, and glaze; they are best described comparatively.⁴³

Shape: no. 14, pedestal crater; no. 15, bowl which may have been a pedestal crater; no. 16, bottom of a cup with ring-foot.

Paste: no. 14, yellowish-cream or light buff; no. 15, dark reddish; no. 16, nearly pure white.

Decoration: no. 14, molded human figures, possibly appliquéd, but more probably a part of the mold of the crater itself; no. 15, leaves in the usual molded technique; no. 16, incised lines hatched in panels.

Technique of Manufacture: no. 14, molded on the exterior, wheel-turned for application of the

⁴⁰ "Rhosica vasa," *American Journal of Archaeology*, 49 (1945), pp. 45-51, with bibliography to date; Gözlu Kule, *Tarsus* I, pp. 191-96, 260-64, with additional bibliography.

⁴¹ Waagé includes no rubric for it at all in *Antioch* IV I.

⁴² No. 14 (H 65) was found at Hajar bin Humeid, about 9 mi. from Timna', which was not destroyed as early as was Timna' (Phillips, *op. cit.*, and W. F. Albright, "The Chronology of Ancient South Arabia in the Light of the First Campaign of Excavation in Qataban," *Bulletin of the American Schools of Oriental Research*, no. 119 (1950), p. 8; nos. 15 and 16 (TTI-895 and TC-2524) were found at Timna'.

⁴³ The following description owes much to conversations on technical points with Mr. Paul McVickar, a professional potter of Chester Springs, Pa.

pedestal and for finishing the interior; no. 15, no traces of the wheel, which does not, however, exclude its use; no. 16, possibly draped over a core, but clearly treated inside and out on the wheel.

Firing: no. 14 shows marks of the stilt-points separating the pieces during the glaze-firing; they imply a modern type of stilt rather than the supports illustrated in *Tarsus*, Figure 153, nos. 666, 668;⁴⁴ nos. 15 and 16 show no trace of stilt separators.

Glaze: 1. *Color:* no. 14, deep green outside, dark yellow inside;⁴⁵ no. 15, bluish-green outside, creamy yellow inside; no. 16, nearly the same green as no. 14, but thinner.

2. *Refraction:* no. 14, highly glassy, especially outside; no. 15, dull and iridescent; no. 16, less lustrous than no. 14.

3. *Coverage:* no. 14, complete and thick, especially outside, with pools below the exterior horizontal string-lines, indicating that the vase was fired upside down; no. 15, complete, but uneven on the more prominent parts, indicating an insufficient application; no. 16, complete on the inside, but careless and wholly lacking on the lower exterior.

4. *Adherence:* no. 14, complete; no. 15, tendency for the outer glassy layer to flake off, leaving a blue-green pigmented layer below; this in turn flakes off in small quantities, leaving an iridescent surface on the bare biscuit; no. 16, chipped off in small patches.

5. *Crazing:* under magnification all three specimens show crazing, which may be merely the result of age.

Of the nine specimens examined by Caley, *loc. cit.*, eight were homogeneous and conform in description to no. 14. Though the ninth was superficially different in appearance, it seemed to him to be really the same fabric merely subjected to conditions which worked in the glaze the changes regularly observed on almost any piece of ancient glass. The softer, less tenacious, iridescent glaze of no. 15 suggests this ninth piece

⁴⁴ These latter were clearly intended to support bowls right-side-up in the oven; for the reason that no. 14 was glaze-fired upside-down, see below.

⁴⁵ Caley, "Specimens of Roman Glaze from Tarsus," *American Journal of Archaeology*, 51 (1947), pp. 889-93, gives a complete account of this. I would only add that the glaze of both colors is flecked with small dark spots which are more probably in the glaze itself than in the surface of the biscuit.

of Caley's. However, the clear difference in biscuit and certain differences in the behavior of the glaze lead me to question the identity of wares between our nos. 14 and 15. As for no. 16, despite some similarity between its glaze and that of no. 14, the clay and decoration mark it as something quite different.

We thus have three vases which show such differing characteristics that they cannot be said to share a completely identical origin and tradition. Since there was a factory of the green-and-yellow glazed ware at Tarsus, it may be that no. 14 came from there to Timna', before A. D. 10. But if no. 14 came from Tarsus, then presumably nos. 15 and 16 came from two other places which we cannot now identify, at times for which we have no evidence other than that from Timna' itself.

VI. Glass

17. (TTI 742). A fragment of dark green glass in the sigillata shape Dragendorff 27 (Plates 144, 145).⁴⁸ A fortunate parallel comes from Haltern in the form of one red glass cup of the same shape except that the upper bulge spreads less widely.⁴⁹ Even more than does the Haltern cup, the Timna' glass sherd resembles the fully developed South Gaulish Dragendorff 27, as distinguished from its Arretine ceramic predecessor, Haltern Form 11. The chronology is difficult when one is undertaking such precision as is desirable at Timna', but if one accepts the pre-

⁴⁸ H. Dragendorff, "Terra Sigillata," *Bonner Jahrb.* 96 (1895), Pl. II, and frequently illustrated elsewhere.

⁴⁹ Kropatschek, *Mitt. aus Westfalen*, 5 (1909), pp. 371 f., Fig. 16.

Varus (A. D. 9) date for the Haltern piece,⁵⁰ the Timna' piece could fall very shortly before or after A. D. 9, as well as substantially later, since this shape in both ceramics and glass is much more characteristic of the Julio-Claudians and of Vespasian than it is of the Augustan period.⁵¹

18. (TC xviii 7). A fragment of a mold-pressed glass bowl (Plates 146, 147). Mrs. Weinberg's discussion and bibliography of ribbed bowls from Corinth are thoroughly adequate for our purposes and need not be repeated.⁵² Her Figure 6 595-7 and Figure 7 603 are convincingly like ours, except that ours, like the glass bowl from Arikamedu,⁵³ has a horizontal groove just below the rim on the inside, an occasional characteristic of these bowls. As a whole, the type is "one of the most common everywhere during the early Imperial period," including Syria and Palestine. If the Qatabanians were to import any sort of glass under Augustus, this is the kind one might expect; at the same time, the caution must be repeated that if they were still in existence to do so, they would have been equally likely to have imported it, like the preceding fragment and some of the pottery, some twenty or more years later. For instance, the fragments of "einer halbkugeligen Schale mit starken Vertikalrippen" and of "einer starken halbkugeligen gerippten Schale," of which the descriptions fit ours perfectly, were found at the Auerberg, which was occupied during the second quarter of the first Christian century with a *floruit* later than Haltern's and earlier than Hofheim's.⁵²

⁴⁸ See note 4 above.

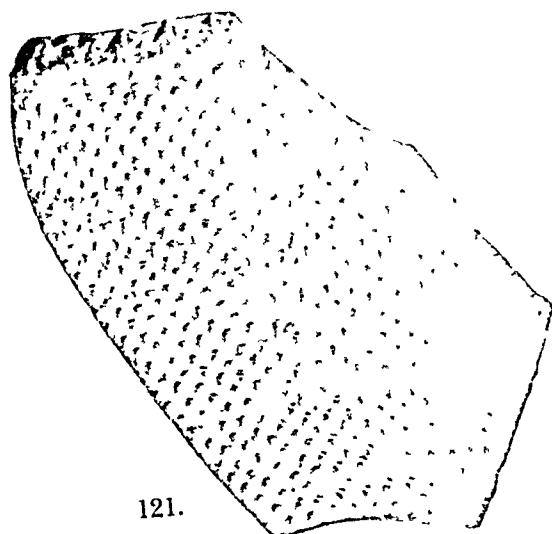
⁴⁹ Kropatschek, *loc. cit.*

⁵⁰ Gladys R. Davidson, *Corinth* XII, pp. 79-80, 95.

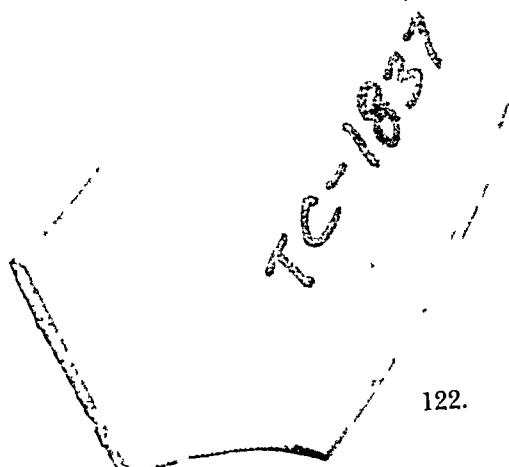
⁵¹ See note 9 above.

⁵² Jacobs, "Fundbericht über die Ausgrabungen auf dem Auerberg in Allgäu," *Beitr. z. Anthropol. u. Urgesch. Bayerns*, 16 (1907), pp. 75-76, Pl. XXI 1 and 5.

Imported Pottery and Glass from Timna^a



121.



122.



123.



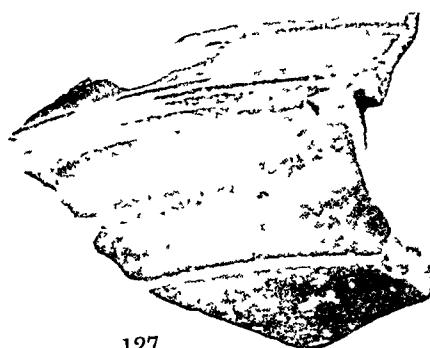
124.



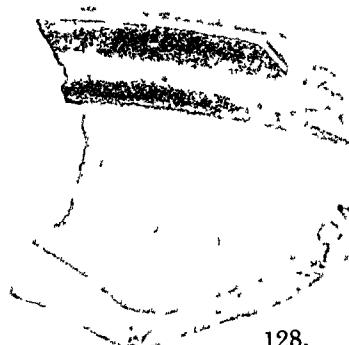
125.



126.



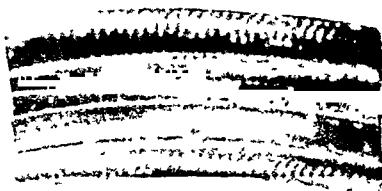
127.



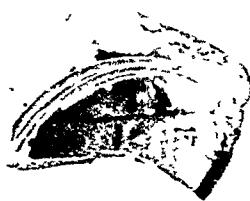
128.

121-128. 121-22 ACO-Ware; 123-28 Italian ("Arretine") Sigillata Ware.

121-122 enlarged by one third, 123-124 at same size; 125 reduced by one seventh, 126 reduced by one eighth; 127-128 enlarged by 28%



129.



130.



131.



132.



133.

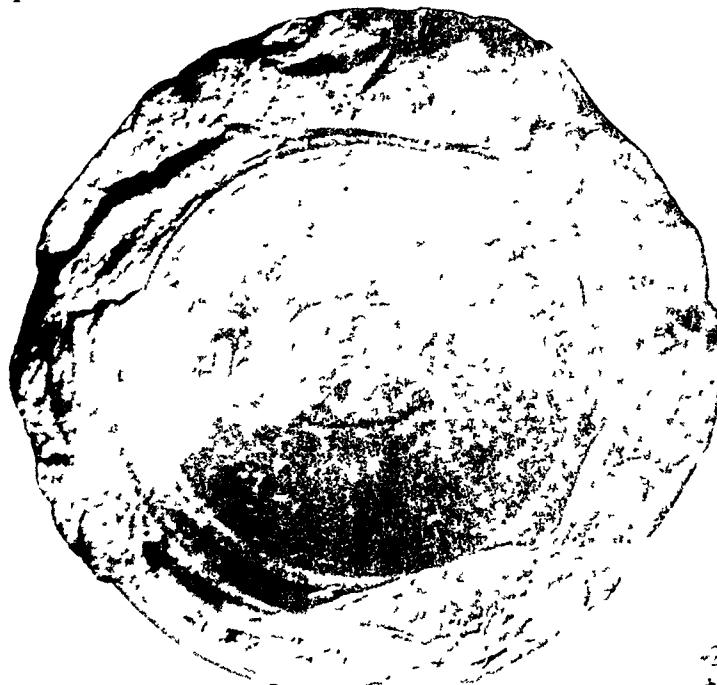


134.

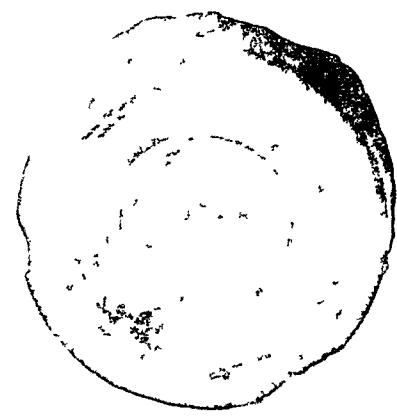
129-134. 129-32 Italian ("Arretine") Sigillata Ware; 133-34 Near Eastern Sigillata Wares.

129 enlarged by one-third; 130 at same size; 131-132 enlarged by 38%;
133-134 enlarged by one-fourth

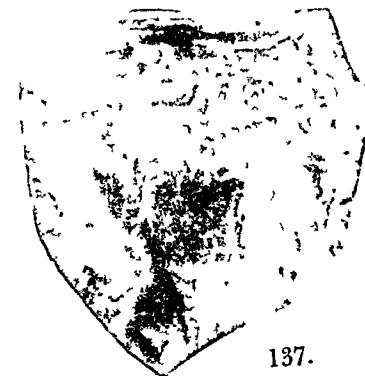
Imported Pottery and Glass from Timna'



135.



136.



137.



138.



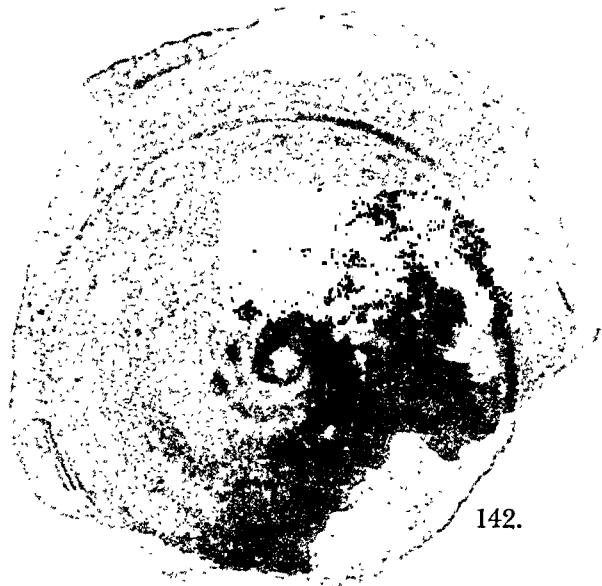
139.



140.

135-140. 135-36 Near Eastern Sigillata Wares; 137-38 "Thorn" Ware; 139-40 Lead Glazed Ware.

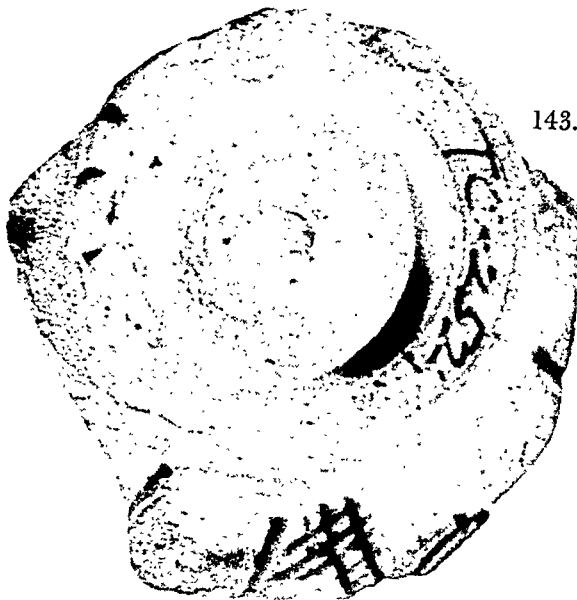
135 enlarged two and one half times, 136 enlarged by 29%; 137-138 enlarged by 15%; 139 reduced by one eighth, 140 at same size



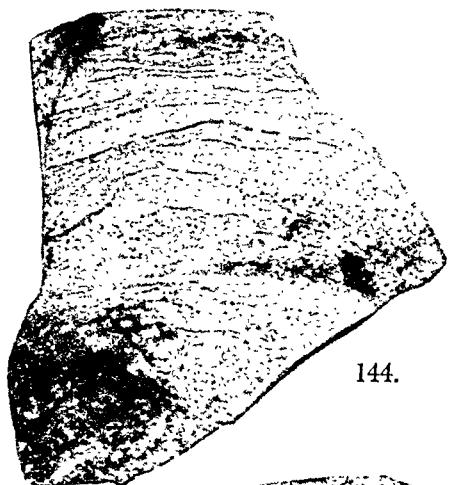
142.



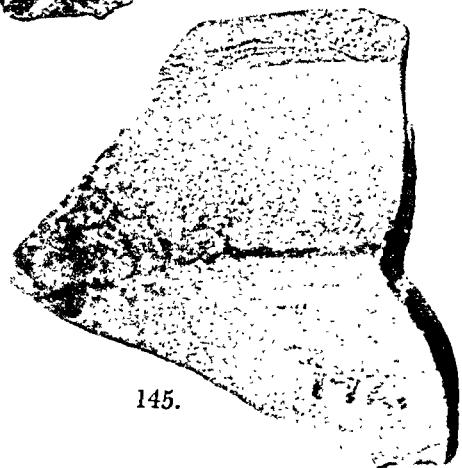
141.



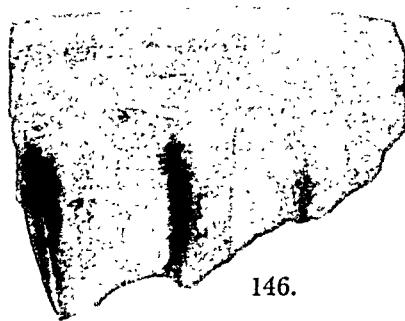
143.



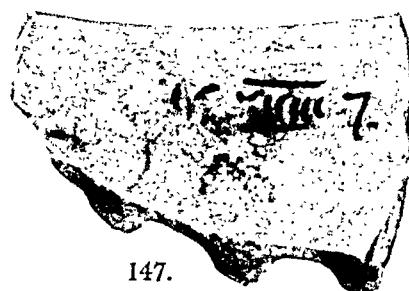
144.



145.



146.



147.

141-147. 141-43 Lead Glazed Ware; 144-47 Glass.

141 at same size; 142 enlarged by 29%; 143 enlarged by one-fourth; 144-145 enlarged by 30%; 146-147 at same size

PART II

EXCAVATIONS AT MÂRIB IN YEMEN

Frank P. Albright

INTRODUCTION

In the present study I have sought to present the results of the excavations at Mârib, in eastern Yemen, which I carried out from December 16, 1951 to February 12, 1952 as chief archaeologist of the Expedition to Saba' conducted for the American Foundation for the Study of Man.¹ During the excavations, and subsequently, while preparing the material for publication, I have incurred a debt of gratitude to many persons who helped me in various ways; it is my pleasant duty to acknowledge their kindness here. First, I would like to thank Dr. Wendell Phillips, leader of the expedition, whose unceasing support both in the field and at home has made this study possible. Special mention should be made of the generous assistance in matters of epigraphy and chronology rendered by Professor A. Jamme, whose study of the Mârib inscriptions will soon appear in print. My special thanks also go to Professor W. F. Albright, who liberally shared his extensive knowledge of pre-Islamic South Arabia and made numerous worth-while suggestions in the course of reading and editing the manuscript. Other improvements in the text have been made by Professor John Young, Dr. Berta Segall, and Dr. Gus Van Beek, to whom gratitude must also be expressed.

The modern village of Mârib (Plates 148-149, 151), with its population of c. 600 to 800, is situated at the northeast end of a mound about 500 m. long by roughly 350 m. wide, which lies

¹ A preliminary report appeared in *Bulletin of the American Schools of Oriental Research* no. 123 (1952), pp. 25-38. For the expedition in general, and the difficulties which finally brought about the abrupt termination of our work at this site, see Wendell Phillips, *Qataban and Sheba* (New York, 1953).

on the left bank of the Wadi Dhâna. Nearer to the wadi, on a second elevation, is a modern compound with a watchtower which served as the headquarters for our Expedition, while, to the southwest, a third elevation holds the *Nazerah*, or fortress. To the west of the *Nazerah* is a circular depression of perhaps 100 m. in diameter. All of these places show evidences of ancient habitation. The edge of the mound itself has been deeply cut away by the spring torrents of the wadi, revealing very deep stratification (Plate 150); the watchtower elevation has been heightened by an artificial fill of at least 3 ft., the circular depression suggests an ancient market place, while at the southwest part of the *Nazerah* the upper parts of piers, with their capitals preserved, still project above the sand (Plate 152). We thus realize that the little village of Mârib is all that remains of a city which extended over the entire area, ancient Mârib,² once a great and prosperous caravan city and capital of the ancient Kingdom of the Sabaeans.

Saba' / Biblical Sheba, and the Sabaeans first appear in history when their queen paid her famous visit to Solomon in the tenth century B.C. Because of this story, the city is still revered by the native population, with the result that Christian visitors have been unwelcome. Before our Expedition gained permission to study the site, it had been seen by only four scholars: Ahmed in 1843, Hulet in 1862, Glaser four times between 1882 and 1894,³ and more recently Falih⁴ in 1947. Our excavations, the first ever

² The Sabean name was Marib, *Mârib*, the modern name for appear in the authority of a *Dictionary*, "Methab," *Encyclopedic Dictionary of the Semitic Languages*, *Marib*, *Encyclopedic of Islam*.

³ The publications of these four scholars are listed in the bibliography.

made at Mârib, were directed (in the time at our disposal) to the oval temple enclosure and especially its great entrance court, the mausoleum, and the south tombs. To the first of these we must now turn our attention.

THE 'AWWÂM TEMPLE

The great temple at Mârib is known as *Haram Bilqîs* or *Mahram Bilqîs*; the former is commonly used by scholars while the latter is the local Yemeni name. *Haram* and its synonym *mahram* are nominal forms derived from a common Semitic root meaning "forbidden" or "prohibited" with a developed or secondary sense of "sacred" as in "sacred territory or precincts." In this sense *haram* is used to describe the sacred areas of Mecca and Medina.⁴ Arnaud interpreted the word to mean the "women's quarters,"⁵ but this is normally rendered by the word *harîm*. *Bilqîs* is the traditional name of the Queen of Sheba; therefore, according to Arab tradition, the site marks the location of the sacred precinct or temple of the Queen of Sheba.

The Sabaean name of the temple was '*Awwâm* ('WM). This was first discovered by Glaser⁶ and is amply confirmed by the large inscription on the outside of the oval wall,⁷ which, together with numerous dedicatory inscriptions found inside the entrance court, affirms that the 'Awwâm temple was dedicated to the moon-god 'Illumquh ('LMQH), the chief deity of Saba'.⁸

⁴ E. W. Lane, *Arabic-English Lexicon* 1, 2 (London, 1865), pp. 553 ff.

⁵ T. Arnaud, "Plan de la digue et de la ville de Mareb," *Journal Asiatique*, 7th série, III (1874), p. 14.

⁶ See Glaser 484 = CIH 957. According to Glaser, this inscription was located on the east side of the oval wall, 28 courses from the top. It is buried quite deep by the drifting sand and was not re-examined by our expedition.

⁷ A. Jamme, "Aperçu général des inscriptions copiées à Mârib (Yemen)," *Bulletin de L'Academie Royale de Belgique, Classe des Lettres*, 5th série, xxxviii (1932), p. 298, MaMB-12.

Location and Orientation

The temple site is located about 144° south-southeast of Mârib across the Wadi Dhâna.⁹ Although it was not possible for us to measure the direct distance between Mârib and the temple, our truck odometer registered 2½ miles following the meandering motor route. The actual distance, therefore, is perhaps slightly less than 2 miles.

Until further clearance around and within the temple has been made, it is impossible to determine whether certain natural features of this location led to its selection as the building site. At present, the surrounding terrain is either level or slightly undulating and covered completely with sand dunes. Glaser, during his visit to the site, saw both bedrock and walls within the oval wall, but this area is now also blanketed with sand.¹⁰

The precinct consists of a large oval or kidney-shaped area enclosed by a high wall with a large rectangular entrance hall on the north-northeast side (Plates 153, 154). It is oriented east-southeast by west-northwest; the long axis of the oval wall lies on the line 112°-292°; that of the entrance hall on 123°-303° (Plate 148). A mausoleum stands on the east-southeast side of the oval wall and is aligned precisely with the long axis of the oval.¹¹

The Oval Wall

The hypaethral area measures approximately 75 m. on the short, north-south axis and 100 m. on the long, east-west axis. A rough measurement was made along the short axis which indicated a length of 71 m.; with allowances for error, a figure of about 75 m. is probable. The length of the long axis is much less certain. An attempted reconstruction, based to be sure on insufficient data, suggests a length of 112 m. While this estimate is undoubtedly too high, Glaser's figure of 86.6 m.¹² is probably too low and the proposed length of 100 m. is a com-

⁸ E. Glaser, *Reise nach Mârib*, ed. D. H. Müller and N. Rhodokanakis (Vienna, 1913), p. 43.

⁹ *Ibid.*, p. 45.

¹⁰ Hereafter all features will be located in terms of the cardinal points of the compass except where clarity demands greater precision.

¹¹ *Op. cit.*, p. 44.

promise. It must be emphasized that these figures are only approximate; an accurate survey was not practicable.

At the beginning of the excavations, much of the upper part of the wall was visible around the circumference of the oval; the lower courses, together with the foundations, were covered by drifted sand to varying heights. Nowhere was the top of the wall found intact. Ancient and modern stone robbers have completely removed the upper courses of the wall whenever the sand drifted high enough to afford easy access. As recently as 1888, when Glaser visited the temple, a section of the top of the wall on the east side was still complete.¹² At that time, Glaser recorded an inscription (Glaser 483) on the north-east side which he found on the 13th course from the top. Today only 7 courses above the inscription are intact; thus 6 courses have been removed since that time. In two places on the west side, 11 or 12 courses remain above the inscription (Glaser 485), which was 14 courses below the top when Glaser recorded it. In 1951, the top of the wall was lower on the south side than elsewhere and was the only section completely covered by sand.

In 1888, Glaser stated that the top of the wall on the east side was 31 courses above ground level.¹³ At an average of about 30 cm. per course, its original height must have been between 9 and 9.5 m. That this estimate is valid and that Glaser correctly interpreted the ancient ground level, will be shown below.

FOUNDATIONS (PLATES 155, 156)

In order to study the foundations and to determine the ground level or levels, a limited sounding was made on the south side, along the outer surface of the oval wall. This area was selected because the accumulation of sand did not extend far from the wall, being in the lee of the prevailing northeast wind. Since the top of the wall had been destroyed, the long inscription (Glaser 485) on the 14th course of the wall slightly to the west was used as the datum for this sounding. While we cannot be certain that this inscription is only one course below Glaser 483 on the east side (not having traced the

course around the oval wall), it cannot be more than 2 or 3 courses below it. In the following discussion we will assume that Glaser 485 is 14 courses below the original top of the wall with the understanding that there is a maximum error factor of 2 or 3 courses. The total course counts from the top are enclosed in parentheses and are computed by adding 14 (the number of courses between the top of the wall and Glaser 485) to the actual number of courses counted below the datum (Glaser 485).

The wall was constructed with a series of three setbacks located at the 20th (34th), 22nd (36th), and 24th (38th) courses below the inscription.¹⁴ At each setback the upper course of the wall was brought in 4.5 cm. The blocks in the lower courses (those immediately above course 30[44]) were not as carefully dressed as those in the upper part of the wall since they were below ground level. Margins were more crudely drafted and the roughly pecked central area of the face was left projecting above the plane of the margins showing that the dressing of the blocks was not completely finished. The blocks in the 30th (44th), 31st (45th), and 32nd (46th) courses were smoothed on top, bottom, and to some degree on the vertical joints, but margins were not drafted on the outer face and the face was left rough. Although the foundation continued down below the 32nd (46th) course, excavation was discontinued at this point in favor of more urgent work elsewhere and because of the danger of cave-ins.

The debris against the wall consisted of drifted sand down to the 18th (32nd) course below the inscription. Extending outward from the wall at that level there was a layer of plaster varying in thickness. The plaster, in turn, rested on a bed of coarse sand about 25 to 30 cm. deep. At the upper part of the 20th (34th) course, a second layer of plaster, similar to the first, was found over a deposit of coarse sand. From the 22nd (36th) course downward, the debris consisted of limestone chips from the dressing of the wall mixed with earth and sand. In this debris several rather large cavities were discovered between the 22nd (36th) and the 25th (39th) courses.

¹² For similar setbacks in the temples at Huqqa and Yeha, see C. Rathjens and H. von Wissmann, *Vorislamische Altertümer, Südarabien-Reise 2* (Hamburg, 1932), pp. 69 f.

¹³ *Ibid.*, p. 45.

¹⁴ *Ibid.*, p. 45.

Although the area cleared was small, the two layers of plaster apparently mark two occupation levels on this side of the temple, an earlier one at the 20th (34th) course and a later one at the 18th (32nd) course. That the ground level once coincided with the 20th (34th) course is indicated also by the identical levels of the mausoleum on the east side and the main doorway on the north side of the temple. The sill of the west door is 2 courses higher (18th course), but is reached by stepping up 15 to 20 cm. from the paved area between the platforms; it may be associated with this ground level. Until further excavations are undertaken, it is reasonable to assume that the area around the outer perimeter of the wall was roughly flat during each period of occupation.

CONSTRUCTION OF THE WALL

The wall was constructed of good limestone ashlar, the blocks varying in length from 1.25 to 1.50 m. The vertical joints were not staggered evenly in successive courses; they were sometimes placed directly over each other or only a little to one side through several courses. The outer surfaces of the blocks were often trimmed to a slightly convex profile, in keeping with the curvature of the oval wall.

The wall surface was dressed after construction. All joints, both horizontal and vertical, on the outside of the wall were drafted with a flat chisel, creating margins around each block. The area within the margins was pecked at random with a pointed chisel, thus filling the surface with shallow peck-marks which ranged from 1 to 3 mm. in depth. The inner surface of the wall was left coarse and rough. Occasional marks were found which had been made with a pointed chisel, but nowhere were the inside joints drafted in the flat chisel technique.

The blocks were laid without mortar and no clamps were used to bind the stones together. No pry or lift cuttings were found. There are variations in the quality of masonry and construction, indicating that several groups of workmen or contractors were employed. This is further shown by the discovery of the marks of different masons on a few blocks in the oval wall and in the entrance hall (Plate 157). Usually these marks are found on the trimmed top or

bottom edges of the block, but occasionally they appear on the face.

The courses are neither absolutely level nor of the same height, and even the height of a single course varies in different places. A normal course ranges between 27 and 31 cm. in height, with an average of slightly under 29 cm.

On the east side of the oval, there is a peculiar gap between the ends of the blocks and, at this point, the courses are inclined noticeably toward the south (Plate 154). At first we believed that this might be the location of a doorway around which the wall had settled, causing the stones to separate and open at the joints. Closer examination, however, revealed that the wall had been constructed with the gap and that the stones had neither shifted nor settled since the marks of the flat chisel, used to smooth a margin 8 cm. wide, continued across the joint without a break. The reason for the gap is clear. Construction on one section of the wall was begun at the west side of the entrance hall and continued around the west, south, and half of the east side; the other section was started on the east side of the entrance hall and extended around the east side until it met the first section at this point. The final blocks were moved into place and shoved tightly against the last stone in each course. Since it was impossible to fit these final blocks closely at both ends, each stone was cut 3 to 5 cm. shorter than the exact length of the space to be filled and the gaps were left open.

The wall is constructed on the casemate principle which is well known in the north in Asia Minor, Syria, and Palestine.¹³ There is another example in South Arabia at Ḫirwāḥ where the enclosure wall of the temple of 'Illumquh is similarly constructed.¹⁴ An inner wall and an outer wall of ashlar are tied together by a series of cross-walls built of roughly rectangular headers, measuring 1 to nearly 2 m. in length, laid in regular courses. Throughout the circumference of the oval wall there are some 60 pairs of these cross-walls with 0.50–1.00 m. between each wall of a pair and 3.00–3.50 m. between pairs. The compartments formed by the cross-walls were filled with rough stones, chips, earth, and sand.

¹³ See W. F. Albright, *The Excavation of Tell Beit Mirsim: The Iron Age*, *Annual of the American Schools of Oriental Research*, xxi-xxii (New Haven, 1943), pp. 12 ff.

¹⁴ A. Fakhry, *An Archaeological Journey to Yemen*, I (Cairo, 1932), p. 32; III (Cairo, 1931), Pls. II (III), IV.

Both the inner and the outer walls were built with a batter of 4 to 6 cm. per m. in height, but there is some variation. Using Glaser's figure of approximately 9.50 m. for the height of the wall and our measurements of both the degree of batter and the thickness of the wall at ground level, 4 to 4.30 m., it is probable that the thickness of the wall at the top was about 3.60 m.

CROWN MOLDING

The entire top of the wall has been destroyed and no stones were found in the excavations which could be definitely assigned to it. Our knowledge of the crowning course, therefore, must be based in part on Glaser's description of the section on the east side of the oval wall which was still intact when he visited the temple in 1888, in part on a comparative study of similar structures in South Arabia and related areas.

There are two possible interpretations of Glaser's description of the crown molding. After mentioning the vents (*Luftöffnungen*) beneath the molding, he states ". . . the structure is finished off at the top by a double cornice which is composed of two rows of square stones projecting like cubes and following one another with a small space between."¹⁷ From this description, Rathjens and von Wissmann have reconstructed the crowning course with rectangular vents and two rows of projecting squared blocks.¹⁸ However, it is also possible to interpret the "two rows of square stones" as raised tegular panels. In this connection, the crown molding of the temple of 'Ilumquh at Ḫirwāḥ, which was constructed by the same man who built the 'Awwām temple, should be mentioned. According to the description and photographs made by Fakhry¹⁹ in 1917, it consists of two courses of large raised tegular panels. The blocks in the course immediately below the lowest band of these panels are set about 15 cm. apart leaving rectangular openings in the wall apparently similar to the vents seen by Glaser and reconstructed in the 'Awwām temple by Rathjens and von Wissmann. Raised tegular panels similarly used are also found on the rectangular temple at Yehā²⁰ and are em-

ployed as architectural decorations on the tops of incense altars, stelae, house models, and column capitals at other South Arabian sites. Furthermore, they appear on the altar or monument base at el-'Amāyid, and the temple Bar'ān near 'Awwām (Plate 191).²¹ Although some of these examples are not architectural crown moldings, they are either conscious or subconscious adaptations of the normal cornice treatment applied to other objects whose architectural problems require somewhat similar solutions. While differences are to be expected, because of the variety of these objects they all confirm the popularity of this type of decoration.

In the excavation of the entrance hall, many large limestone moldings with raised tegular panels were found (Plate 158). One block measures nearly 3 m. long, 60 cm. wide, and about 35 cm. high. On three sides it is roughly dressed except for a band about 10 cm. wide along the front at both the top and the bottom, which was smooth. The face is finished with a fillet 13 cm. wide, along the top and a row of broad, shallow, raised tegular panels immediately below. The raised tegular panels measure about 35 cm. wide and are separated by a channel 3 to 4 cm. wide and 2 to 3 cm. deep. They are cut back about 3 cm. at the top and slope outward so that their lower edges are on a level with the top band. Numerous similar fragments of moldings were uncovered during the excavation. One, approximately 1.50 m. long, was found built into the oval wall on the south side where it had been reused as a header. Another was re-employed as a base for inscribed stelae and still others were found in the bench and other structures in the west corridor.

Since the raised tegular panel motif was widely used in South Arabian architecture, the reconstruction of the crowning course of the oval wall with raised tegular panels is quite probable. If, however, the reconstruction with projecting cubes made by Rathjens and von Wissmann is the correct interpretation of Glaser's verbal de-

(Deutsche Aksum-Expedition II) (Berlin, 1913), p. 80, Fig. 165.

¹⁷ Glaser, *op. cit.*, p. 138.
¹⁸ Rathjens and von Wissmann, *op. cit.*, p. 66, Fig. 32.
¹⁹ Fakhry, *op. cit.*, I, p. 32; III, Pl. II, IV.
²⁰ D. Krencker, *Ältere Denkmäler Nordabessiniens*

scription, it is necessary to seek an explanation of this divergent and seemingly unusual treatment. It may be that the architects who built the 'Awwām temple noticed the feeble character of the large raised tegular panels on the Sirwāḥ temple, which was probably built first, when used as the main motif at a height of 10.50 m. To overcome this defect and give the crown more weight, they may have devised the more austere and heavier frieze of staggered projections. In any case, the exact nature of the crowning course must remain an open question. Perhaps further excavation and a careful study of ancient blocks built into the buildings of modern Mārib will provide the solution to this problem.

WEST DOOR

Arnaud stated that there were two entrances to the temple, one on the north (the main entrance) and a second on the south side of the oval wall.²² Since the south side of the wall had been quarried more thoroughly than the other sections and was completely covered by sand, he may have supposed a break in the wall and the existence of a doorway at this point. Excavation in this area, however, disclosed that the wall continued without a break.

Nevertheless a second entrance was found on the west side of the oval (Plate 159). It consisted of a simple doorway contained in a flat panel which was set in an opening in the wall. At its south end, the two remaining upper courses of the panel were bonded into the oval wall, proving that the former was contemporary with at least the upper part, if not all, of the latter. The panel is preserved to a height of five courses above the doorway and measures approximately 2.75 m. wide. It is flush with the oval wall and is battered at the rate of 2 cm. for each meter in height on the outside. The doorway itself is 88 cm. wide and 2.55 m. high. The reveals measure 2.79 m. high, extending 23 cm. above the doorway, and 38 cm. deep at the bottom tapering to 33 cm. at the top; the vertical inner faces are 11 cm. wide on the south and 12 cm. wide on the north. The passage continues another 65 cm. in depth on the north side and 63 cm. on the south side and then opens out, suggesting that the total depth of the panel is

98 cm. to 1.03 m. Excavation was not continued beyond this point so that the doorway on the inside of the oval wall remains unknown.

That a two-leaved door, which was probably wooden, secured the entrance is shown by the discovery of socket holes, approximately 8 cm. in diameter, in the floor and ceiling behind each jamb. Bolt holes, located 1.5 m. above the floor and measuring 7.5 cm. wide and 6 cm. high, were found on both sides of the doorway and their relationship to the jambs indicate that the door was no more than 8 cm. thick. Overhead and near the center of the doorway, there were two smaller holes between 10 and 15 cm. deep which had been cut to receive lighter bolts or door catches.

Outside the door, there was a low step 1.30 m. long with a tread of 26 cm. Paved platforms abutted against the oval wall and the edges of the step. The northern platform extended 2.12 m. from the temple wall and measured 1.25 m. wide; the southern was 2 cm. shorter and its width varied from 1.35 m. against the wall to 1.27 m. at the outer edge. The area between the platforms and leading to the doorway was paved and set 15 to 20 cm. below the top of the platforms. The inner 25 cm. along the edge of each platform adjoining the paved area proved to be a later reconstruction or repair.

Rows of holes extending down both sides of the doorway indicate that some kind of metal strips or panels had once framed the door. Immediately above the doorway, there is a recessed panel measuring 88 cm. long by 56 cm. high (= 2 courses) and approximately 8 to 10 cm. deep. A three-line boustrophedon inscription (MaMB 8 = Jamme 553) was cut into the stone panel. This inscription, by the same author and containing a summary of MaMB 6 = Jamme 552 (see below), was later covered over by a metal object, probably an inscribed plaque. A large four-line boustrophedon inscription occupied the 2nd and 3rd courses above the panel (MaMB 6 = Jamme 552). It records the names of Yadi'il Bayyin and Sumuhu'alay Yanaf and is assigned by Jamme to the end of the sixth or the beginning of the fifth century B. C. on the basis of palaeography.

To the right or south of the large inscription, a bronze (?) animal in relief, measuring more than 2 m. long, had been attached to the oval wall (Plates 159, 160). Since the figure was flat,

²² Arnaud, *op. cit.*, p. 14 and plan.

its outline was partially cut into the stones in order to compensate for the slight curvature of the wall surface. The shape suggests that the animal was a bull; what remains of the cutting accommodated the lower part of the neck, the forelegs, the front of one hind leg, and the ground below. The hind part perhaps stood free of the curving wall, while the top of the cutting is missing, since the upper courses of the wall have been removed at this point. The animal faced the left (north) and was presented in a walking attitude.

NORTH ENTRANCE

The temple was entered from the south side of the entrance hall through a doorway between two massive pylons set 1.64 m. apart and measuring 4.50 m. long and 3.66 m. wide (the measurements of the west pylon). Although a careful examination of their construction was not made, it seems probable that they were built of an outer shell of ashlar masonry filled with rubble and volcanic cinder blocks. The inner surfaces of the pylons were smooth and level with the jambs, which were built into the corners of the pylons. The southern face of each pylon had two recessed panels, each of which measured 51 cm. wide and 10 cm. deep (Plate 162).

INTERIOR OF THE TEMPLE

Very little is known of the inner structure or structures of the oval temple or precinct. Glaser reported that he had seen not only bedrock, but also walls of rooms whose function he could not determine;²² the whole is now covered with sand. Whether the walls observed by Glaser pertain to the temple or belong to inhabitants who settled there after the temple fell into disuse cannot be determined until the area is excavated.

Before the excavations were disrupted, clearance was begun within the temple just inside of the north doorway (Plate 161). A wall, 69 cm. thick, was found parallel with and 2 m. from the south faces of the pylons. The top surface of this wall was smooth enough to have been the actual top and its height was the same as the two gables at either end of the passage between the pylons.

²²Glaser, op. cit., p. 43.

Neither the area between the wall and the pylons nor the south face of the wall was excavated, although a sounding to a depth of slightly over a meter revealed only a sand fill. At a later date another wall was built on top of the west end of the earlier wall and a small room was added against the south face of the west pylon. The room measured 1.18 m. wide by 2.03 m. long and was level with both the old wall and the sills. It was finished with plastered walls, a cement floor, and a base course possibly for protection against water damage. No doorway was found and only the lower 50 cm. of the base course and the south half of the floor were preserved. The walls were constructed of reused stones including one with an early boustrophedon inscription and another with a later inscription. The poor quality of the lime cement and plaster point to a late date for this structure.

Beginning at the southwest corner of the room and at a distance of about 50 cm. from the wall, a flight of stairs consisting of six steps descending in a southeast direction was found. The top of the staircase was missing and we did not excavate to the bottom. The stairs are similar to those in the northeast corner of the court see below. The tread of the steps was approximately 1.15 m. long and 17 cm. wide with a rise of 16 cm.

DATE OF THE OVAL WALL

The source and significance of the oval design of the enclosure is still unknown. Perhaps the closest parallel is found in the temple at Shurab where the east wall is semicircular in plan. The other three sides of the structure are straight, however, and resemble the Marwim temple only in construction technique.

With regard to the date of the oval wall, we are on firmer ground thanks to several dedicatory inscriptions in situ on its outer surface. The earliest of these is Glaser 454 = CTH 957, on the 23rd course from the top of the wall on the east side, which states that Yaqutah Dhu'lqayn, the son of Sumayyilah, a member of Saber, built the wall of Marwim. W. F. Albright now dates Yaqutah Dhu'lqayn about the middle of early in the second half of the seventh century A.D.²³ In view

²³The first step is probably Glaser 2, see W. F. Albright, "A Note on Early Islamic Chronology," *Bulletin of the American Schools of Oriental Research*, no. 162, pp. 3-12.

of this inscription and Van Beek's comparative study of the masonry (see Appendix V), we can confidently assign the construction of the lower courses of the wall to about the middle of the seventh century B.C. Whether the oval wall is built on the remains of a still earlier enclosure wall that followed the same line, or replaced an earlier enclosure wall with a different alignment, could not be determined during our brief excavations. That there was an earlier enclosure wall is probable since the temple itself must be older than the early construction phase of the oval wall.

Other inscriptions indicate several phases of restoration or new construction. Glaser 481 (= CIH 375 = Jamme 550) on courses 13 and 14 on the north side of the wall states that Tuba'karib, in the service of Yadi'il Bayyin, Ya-krubmalik Watar, and Yithi'amara Bayyin, dedicated (and presumably built) the wall from the inscription (courses 13 and 14) to the coping. Fourteen courses from the top on the west side of the wall, Glaser 485 (= CIH 374 = Jamme 551) relates that 'Ilsharah, son of Sumuhu'alay Dhirrih, dedicated the wall from the inscription (course 14) to the coping.²⁵ From these and other inscriptions we know that these rulers are among the earliest kings of Saba'.²⁶ The last mukarrib and the first king of Saba', Karib'il Watar, can now be dated c. 450 B.C.²⁷ so that these rulers must have been in power toward the end of the fifth or the first half of the fourth century B.C. It follows then that the upper 14 courses of much of the present wall were laid during the late fifth century B.C. Whether the upper courses of the old wall had deteriorated and were rebuilt at this time or the height of the wall was raised a total of 14 courses by new construction, can be determined only by further excavation.

To this period or earlier belongs the construction of the west door and of the inscribed panel immediately above. The inscribed panel (MaMB

²⁵ For other inscriptions bearing on this building phase, see A. Jamme, "An Archaic South Arabian Inscription in Vertical Columns," *Bulletin of the American Schools of Oriental Research*, no. 137 (1955), p. 38.

²⁶ They occupy positions 2-5, 6 in J. Ryckman's list; see *L'institution monarchique en Arabie Méridionale avant l'Islam* (Louvain, 1951), pp. 336 f.

²⁷ See W. F. Albright's review of J. Ryckman's *L'institution monarchique en Arabie Méridionale avant l'Islam* in *Journal of the American Oriental Society*, 73, 1 (1953), p. 40.

8 = Jamme 553) contains a summary of the longer boustrophedon inscription 2 courses above (MaMB 6 = Jamme 552) and must, therefore, be contemporary with it. In turn, the latter cannot be later than Glaser 485 and may be slightly earlier since it is associated with the west door, which is architecturally earlier than the construction referred to in Glaser 485. Thus this entrance in its present form must be dated no later than the second half of the fifth century B.C. and may be earlier.

Still other repairs are described in inscriptions of Karib'il Watar Yuhan'im and his son Halak'amar, who ruled as kings of Saba' and Dhū-Raidān about the middle of the first century A.D.²⁸ These inscriptions, on the 13th course below the top of the wall on the south (Glaser 482 = CIH 373) and east (Glaser 483 = CIH 373) sides, state that these kings restored parts of the crown molding, which was in a ruinous condition.²⁹

In a large structure such as the oval wall, it is reasonable to assume that still other repairs and restorations were made during the many centuries of its use. Many of these are probably recorded on inscriptions which remain buried beneath the sand. Until the wall is completely cleared and its construction is studied in greater detail, we cannot give a full treatment of the history of its construction.

The Entrance Hall (Plate 162)

A gap, 25.50 m. long, was left in the northeast side of the oval wall. In this space, a large entrance hall was constructed which hid the rough ends of the oval wall. Although the entrance hall was almost completely excavated, an examination of its foundations and the levels beneath its floors was not made, because of the abrupt termination of the excavations. Whether it was built over the ruins of an earlier entrance hall was not determined. Since it was not properly aligned with the oval temple, and in view of the number of inscriptions found which antedate

²⁸ *Ibid.*, pp. 33 f.

²⁹ N. Rhodokanakis, "Studien zur Lexikographie und Grammatik des Altsüdarabischen II," *Abh. Kaiserl. Akademie der Wissenschaften in Wien*, 185, 3 (Vienna, 1917), pp. 23 f.

its construction, the existence of a precursor is probable.

The hall as it now stands consists of a hypaethral court surrounded by a peristyle hall. The structure was rectangular in shape and measures on the inside 23.97 m. along its east-west axis and 19.15 m. along its north-south axis. A single doorway on the south provides access to the temple and a triple door on the north leads to an outer structure, in front of which stands a row of eight huge monolithic piers.

The entrance hall is oriented 33° clockwise from the cardinal points of the compass, 11° clockwise from the long axis of the oval wall, and 5° clockwise from the flattened or slightly depressed ends of the oval wall. For that reason, its southeast corner projects 2.80 m. into the oval while the southwest corner extends only 55 cm. (Plates 163, 164).

WALLS

The walls were constructed with good limestone ashlar in a technique similar to that used for the oval wall: the surface of the blocks was finely pecked and the joints were drafted with a flat chisel. In several places, vertical drafted margins appear where no joints exist (Plate 165). The walls consisted of an inner and an outer range of ashlar with rubble fill between; whether they were bonded together by cross-walls was not determined. The headers, which frequently appear in the wall surface, may be the ends of cross-walls. Since this method of construction was much used in South Arabia (witness the oval wall and other South Arabian temples), it is probable that it was employed here also.

Along the portico floor, there was a base course 10 cm. thick and 26 cm. high. At an average height of 1.52 m. (5 courses above the base course), the wall projected 10 cm. and, from that point upwards, was battered approximately 5 cm. to each meter except at the doorways, where it was vertical. The batter increased almost imperceptibly from the doors to the corners. Above the false windows, the walls average from 74 to 80 cm. in thickness except for the north wall, which measures 1.62 m.

WINDOWS

A total of 61 false windows decorated the inner faces of the walls (Plates 162, 165, 166, 168). They were neatly and uniformly cut in limestone and apparently imitated wooden lattices. The windows measure 1.24 m. high and range between 12 and 16 cm. in width. They are recessed in the wall to a depth of 10 cm. and are spaced from 15 to 70 cm. apart.

Each window is decorated at the top by a grill, produced by cutting a series of horizontal grooves one below the other; the grooves are V-shaped in profile. Immediately below, there is a row of 5 raised regular panels which measure slightly under 5 cm. square and are spaced about 1 cm. apart. They are cut back at the top so that they slope outward toward the bottom and their lower edges are flush with the side panels. Below these panels there is a horizontal band set back 1 cm. This band and its counterpart at the base of the windows simulated the horizontal boards into which the vertical slats were fastened. The latter are represented by three vertical members which are recessed 1 cm. more. Six horizontal members, evenly spaced and set back another 5 mm., appear to cross behind the vertical slats and complete the lattice effect. Two rows of 7 apertures are formed by the intersection of the slats; each aperture measures approximately 6 cm. high, 3.5 cm. wide, and 2 cm. deep.

Directly above each window, the grill and raised regular panel motif was repeated on a slightly larger scale. The entire wall above this course has been destroyed except for a few remnants, 1 or 2 courses high, on the east side. These few blocks prove, however, that the course above the grill contained another series of insets which were also centered over each window. Although numerous fragments of decorative blocks were found in the debris, none fitted the space and no conjectural restoration is possible. On the outside of the north wall are similar ornamental windows, placed approximately 70 cm. lower on the wall and without regard for the spacing of those on the inside. Whether the outside of the other three walls is similarly decorated we do not know.

PIERS

The width of the portico averaged from 4.20 to 4.25 m. on the south side and from 2.22 to 2.30 m. on the other three sides. Its roof was carried on the outside by the walls and on the inside by 32 rectangular piers and two massive pylons. The first pier west of the pylons as well as three on the east side are missing. Four more on the east side and three on the south side have fallen; two, though dangerously leaning, were held in place by the sand. On the west side, six fell during the excavations when a workman accidentally knocked out a wooden prop used to brace them.³⁰ Some of the plinths and parts of some piers showed considerable disintegration, resulting, perhaps, from the proximity of Bedouin campfires after the abandonment of the temple.

All of the standing piers are limestone monoliths except two, which are constructed in two parts. No cement or clamp of any kind was used; they held their positions solely by their weight.

The north and south piers measure 46 by 53 cm. and are 5.30 m. tall. Those on the east and west sides are slightly smaller, measuring 39 by 45 cm. with a height of 4.95 m. Throughout there is a variation of about 2 cm. in dimensions. Using the proportion of the greatest thickness to the height, the ratio of the east and west piers is 1 to 11 while that of the north and south rows is 1 to 10. The piers are set with their longer axes perpendicular to the portico; the corner piers belong with those on the east and west sides. Except for the one in the northeast corner, the top of each pier was cut back, leaving a rectangular tenon which measures between 10 and 12 cm. square and 8 cm. high and was used to secure the entablature.

The piers rested on monolithic plinths, with the exception of the first one east of the north entrance, which stood on a base 81 cm. high. The plinths extended 20 cm. beyond each side of the piers and were level with the cement peristyle floor. Although neither their depth nor foundation structure is known, they were anchored solidly and presumably were set rather deep.

³⁰ The more unstable piers were braced with wooden props until they could be secured with concrete. The cement, however, never arrived.

Considering the great number of piers preserved in the entrance hall, the fact that not a single capital or fragment of a capital was found seems to indicate that no capitals ever existed.

It is scarcely likely that the piers carried architraves, since no vestige of the architrave was found. If the portico had a stone architrave, its absence must be attributed to the work of stone-robbers who found in the blocks good building material. If, on the other hand, a wooden architrave was used, it must have perished, leaving no trace. Of the two possibilities, a stone architrave is more probable. The fact that the piers were placed so close together suggests that stone was used, since a wooden architrave could easily span a greater distance. Furthermore, the treatment at the corners would argue in favor of stone. As noted above, the north and south piers were 35 cm. higher than those on the east and west sides. At the corners, the stone architraves on the north and south piers would have rested on the east and west architraves, which would have been 35 cm. high. A wooden architrave would not have been that high.

A more probable reconstruction would eliminate the use of an architrave altogether and substitute beams or joists extending from the wall to the piers (Plates 167, 169). Whether stone, wood, or both were used for joists remains uncertain. The span of 3.70 m. on the south side is somewhat long for stone and suggests the probability of wooden beams; however, the possibility that stone may have been used must not be excluded entirely. In any case, the joists on the east, north, and west sides were almost certainly of stone. When viewed from the court, the ends of the joists must have had the effect of capitals. The corner problem was solved by placing the north-south joists directly on top of the east-west joists over the corner piers; any method of reconstruction places a disproportionate load on the corner piers.

According to this reconstruction, ledges, cut in the upper edges of the joists, would carry the stone ceiling slabs. That this type of construction was employed in the temple complex is suggested by the discovery of a complete ceiling joist in the mausoleum (Plate 187 and see below) and by the use of a similar technique in constructing the floor of that building (Plate 188).

The roof was presumably flat (sloping slightly toward the edges) and surfaced with *tin* (mud

specially prepared for mortar and surfacing). The ubiquitous South Arabian carved bull heads may have served as water spouts along the eaves. Although a number of them are stored in the "Museum" at Mârib, none has been found *in situ*. They were commonly used with offering tables, but whether they also functioned as drain spouts on buildings is not certain.

NORTH ENTRANCE (PLATES 170, 171)

The court was entered from the north through a triple doorway. The central doorway lies between two massive pylons; it is 3.50 m. wide. There are also two lateral doorways, each 2.70 m. wide, between the pylons and the ends of the north peristyle wall. The door frames were placed in cutbacks 3 cm. deep; for the side doors they were 24 cm. wide in the wall ends and 38 cm. wide in the pylons, and for the center door they were 41 cm. wide in the pylons. The frames, like the doors, were probably made of wood.

There was little indication of either the height of the doorways or the type of door used. A heavy single-leaf door would have required a vertical pivot post with sockets in both the floor and the ceiling; since no pivot sockets were found in the floor, it is probable that light, double doors were employed, the sockets, or hinges, of which were carried in the door frame.

The pylons are constructed of solid masonry laid in courses. They extend across both the width of the peristyle and the thickness of the north wall, a total length of 4.10 m. At their south ends, they measure 2.36 m. in width and expand to 2.46 m. at a point in line with the inner face of the wall. From that point northward, their width contracts by a series of setbacks on both sides so that at their northern ends, they are only 1.16 m. wide. The passageway between the south ends of the pylons measures 2.14 m. and narrows to 1.90 m. where the pylons reach their greatest width. The inner edge of the south ends of each pylon has a cut 2 cm. deep and 10 cm. wide.

The inner (south) edges of the ends of the walls were buttressed at a later date by the addition of masonry, 54 cm. thick, although possibly these additions functioned less as wall buttresses than as supports for the overhead structure.

Later the western door was blocked completely by a rough wall.

SOUTH DOORWAY

A single doorway, measuring 1.44 m. wide between the inner jambs and 3.96 m. high, led from the court into the temple (Plate 172). In all probability, the opening never held a door, since neither pivot sockets nor bolt holes were found. The monolithic door jambs were built into (and thus formed the corners of) the pylons. Their inner reveals measured 40 cm. wide and formed a continuous surface with the inner sides of the pylons. The second or outer reveals were 26 cm. wide and were set back 43 cm.; the outer faces were 29 cm. wide. Both the inner (south) and outer (north) members of the jambs have tenons at the top to secure lintel beams; the former held the lower lintel and the latter, which was 34 cm. higher, carried the upper lintel. The outer jamb reached a height of 5.10 m. above the colonnade floor, 20 cm. shorter than the piers.

The jambs stand on a huge block of granite stone, 3.58 m. long, approximately 53 cm. high, and 74 cm. wide, which forms the sill and the upper step. In front of it, another granite block, which measures 2.70 m. long, 29 cm. high, and 30 cm. wide, serves as the lower step. The latter replaced an earlier step which evidently had been eroded by water during the years (see below); the new step was so placed as to permit the water to flow under rather than over it. Both of these step-blocks were cracked, the upper one near the east jamb and the lower one near the west end.

The steps were once covered with bronze sheathing; a great deal of copper oxide is still visible; indeed, it is possible that the whole passage between the pylons originally had a bronze floor. Between the sills, the lowest courses of the pylons are recessed 2 to 4 cm. for a height of about 22 cm. These recesses were filled with lime cement and faced with bronze, bits of which were still in place when the area was excavated. Except for a stone rim about 20 cm. wide, the floor area was filled with sand; a trial dig to a depth of more than a meter failed to reach bottom.

To our great surprise, we found that falling water had worn a large hole, 52 cm. wide, in the

upper step and had cut into both the sill and the lower step, which replaced an earlier one (as noted above). The immediate source of this water was not ascertained. Jamme has suggested that it was the overflow from a bronze basin located on the floor between the pylons through which the worshippers stepped as they entered the temple.³¹ In view of the bronze fragments on the plaster in the recesses of the pylons, it is more than possible that there was a basin or tank in the entrance, the water from which overflowed and ran over the steps. But an overflow, falling only a few centimeters, would hardly account for the peculiar way in which the steps have been cut by the water (Plates 172, 173). The evidence suggests rather that the water came from overhead, falling on the steps with force. The extent of the eroded area indicates that the source was quite probably as high as the lintel. Why the water should fall on the steps from above is difficult to explain. If there was, in fact, a basin, we might expect a shower or trickle of water to fall into it, but no evidence of falling or splashing water was found on the pylon walls.

Presumably there was a well in the immediate vicinity which supplied the water for this installation.³² It was located almost certainly within the oval and perhaps on the rocky outcrop which Glaser saw. It would not have been much more difficult to fill a tank on top of the pylons than one on the floor between them. Perhaps the reason for constructing such massive pylons inside the temple is that they supported some heavy object, such as a water tank.

DRAIN

After passing beneath the bottom step, the water flowed in an open channel which led across the colonnade floor, where it turned west, then north along the west side of the first pier to the west of the doorway. It entered a covered conduit, continued through the west side of the platform, and emerged in a large inscribed bronze

basin (see below) at the north end of the platform (Plate 172). From the basin, it ran eastward and then northward across the court, and passed through a bronze lining in the stone sill of the easternmost outer door. Then it dropped to the level of the outer pavement, continued northward several meters, turned east, and disappeared under a large platform-like structure which carried a stone table and benches.

The channel was cut from limestone throughout except for the section in the colonnade floor where alabaster was used. It was approximately 15 cm. wide and between 5 and 7 cm. deep. At the bottom, the water had cut a meandering secondary channel from 3 to 7 cm. wide and 5 to 6 cm. deep. This secondary channel indicates that the water flowed for a very long time in a steady stream which did not fill the bottom of the drain.

The bronze basin with the dedicatory inscription is quite large. The surface across which the water flowed measures 69 cm. wide and 2.30 m. long. Later a block (53 cm. wide) was placed at the east end, leaving only a small channel for the passage of the water. Along the front side of the basin, there is a rim (c. 4 cm. high). The one-line dedicatory inscription (MaMB 302 = Jamme 829) is located on a ledge at the back of the basin, 20 cm. wide and 19 cm. above the bottom. It is assigned by A. Jamme to the late fifth century B.C. on the basis of palaeography. Jamme notes that the text mentions a [Sum] huwatar, a brother of Yadi'il and Yithi'amara; he also suggests that Yadi'il and Yithi'amara may be the two kings who belong to the beginning of the kings of Saba' period and who are in part responsible for the construction of the upper courses of the oval wall (see above).

The significance of the basin is uncertain. It may have been simply a gift to be used in religious rites, although perhaps its dedicator received a special blessing by having the water come in contact with his dedication. A similar tank discovered in the temple at Khôr Rôri must have been used in the ablution ritual. Although made of limestone and uninscribed, its function was similar to that of the bronze basin; water entered by means of a hole at the bottom of one end and left through another hole at the bottom of the other end.

³¹ Jamme, *op. cit.*, p. 305.

³² A well was found in the center of the temple 'Illum at Khôr Rôri in Dhofâr. cf. F. P. Albright, "The Himyaritic Temple at Khor Rori (Dhofar, Oman)," *Orientalia*, 22 (1953), pp. 284 ff.

STRUCTURES IN THE COURT

The platform adjoining the bronze basin, through which the drainage channel passed, is approximately 56 cm. high, so that its top is level with the floor of the colonnade. It is somewhat irregular in shape with sides measuring 2.76 m. (south), about 2.40 m. (north), 2.65 m. (east), and 2.54 m. (west). There is a projection on the east side which measures 1.05 m. by 28 cm. The west side is built out over the water conduit in stages, culminating in a block at the end of the basin, 1.01 m. long and 90 cm. wide. Two steps were found, one near the south end of the west side and the other on the east side.

Several other platforms and platform-like structures were found, the functions of which remain unclear. West of the center platform, in an area where the court floor is 43 cm. lower than the colonnade floor, there is a raised section, 22 cm. high, with two large blocks placed 1.37 m. apart. Each of these blocks (the one measures 1.10 m. long by 41 cm., the other 1.10 m. by 47 cm.) has two pairs of holes on its top surface where statues had probably been fastened. When discovered, the blocks were tilted, but it was evident from the position of the blocks around them that they had originally been level. Some of the blocks which occupied the space between the bases had been removed. On the end of one that remained, 'LMQH was inscribed.

Against the inner (south) side of the two pylons of the triple doorway, limestone benches were built which may have served as ledges for votive inscriptions or monuments. Several inscribed stones were found on the west bench, but whether they belonged there could not be definitely established. The benches measure about 50 cm. high and approximately 25 cm. wide, about half the normal width of other benches at this site (see below) and rather narrow for seats.

The court floor is approximately 10 cm. lower in the center than along the southern edge, thus sloping slightly toward the triple doors to the north. It was repaved with older inscribed stones, many of which were copied and photographed by Jamme. Unfortunately, time did not permit him to copy all of them. After being studied, the inscriptions were covered with a layer of sand to protect them from damage. Of the inscriptions copied, eleven (MaMB 259-MaMB 269),³³

located in the southwest corner of the court, are particularly important for dating the present pavement. The latest of these (MaMB 265 = Jamme 647) mentions Yasrum Yuhan'îm and his son Shammar Yuharish, the two last kings of Saba' and Dhû Raidân (early in the fourth century A.D.) and thus provides a *terminus post quem* for the floor. A date slightly later, after Shammar had declared himself "King of Saba', Dhû Raidân, Hadhramaut, and Yamanat," early in the fourth century A.D., for the pavement in this area cannot be far wrong.

STRUCTURES IN THE PERISTYLE HALL

Numerous structures were built in the peristyle hall. A bench, made of volcanic cinder block (height 50 cm. by width 50 cm.) was built along the east, south, and west sides of the entrance hall; presumably there was none along the north wall. The bench located at the northern end of the east side has been removed to permit the construction of rooms (see below). This bench was intended to serve as a seat rather than a ledge for votive monuments. Although hundreds of inscribed stones and several plain or inscribed statues were found, there was no indication that any had been placed on the benches except two large horizontal blocks which were found on the south end of the bench along the east wall. These two blocks were inscribed and served as bases for bronze statues.³⁴ In order to carry their weight, the bench was reinforced with limestone blocks.

East Side: Two rooms were constructed in the northeast section of the peristyle hall after the hall itself was completed (Plates 174, 175). They were contained on the north and east by the outer walls of the peristyle hall, on the south by a wall built between the fourth pier from the north and the east wall, and on the west by two walls erected from the north wall to the first

MaMB 261 = Jamme 745; MaMB 262 = Jamme 586;
 MaMB 263 = Jamme 578; MaMB 264 = Jamme 746;
 MaMB 265 = Jamme 647; MaMB 266 = Jamme 565;
 MaMB 267 = Jamme 630; MaMB 268 = Jamme 747;
 MaMB 269 = Jamme 563.

³³ Their combined length was 4.07 m. The right stone carried an inscription of 23 lines (MaMB 278 = Jamme 606) and is dated about the end of the first century A.D. by A. Jamme. The left one (MaMB 272 = Jamme 748) bore both an inscribed tribal name and a bronze plaque.

³⁴ MaMB 259 = Jamme 618; MaMB 260 = Jamme 642;

(corner) pier and from the latter to the second pier. These western walls served primarily as the east side of the stairwell (see below) and were left rough. The space was divided into two rooms by the construction of a wall from the corner pier toward the east wall; it stopped short, however, leaving a space of 80 cm. for a door. The complex was entered from the court through the intervals between the second and the fourth piers.

Another small room was constructed in the north side of the colonnade, west of the stairs. It was confined on the north by the north wall of the entrance hall, on the east by a wall built between the north wall and the second pier from the corner, on the south by a wall constructed between the second and the third piers, and on the west by a wall extending from the north wall toward the third pier, leaving a gap next to the pier for a doorway.

The staircase, the sides of which were formed by the walls listed above, was located between the corner and second piers on the north side of the entrance hall. Although time did not permit the study of construction methods, in all probability the steps were supported by corbels projecting from the walls. They were cut to fit snugly between the walls with the exception of the lower four, which were open at the west end. Eleven steps are *in situ*. At the eleventh step, there was a landing, the floor of which is now missing. The first step of a flight to the right was found resting on the east side of the landing. The second step was the top of the staircase wall, and the third and fourth steps were found in the sand, nearly in place. Their original position was easily determined by marks on the north wall, against which they had abutted. There was, however, no indication of any form of support. Probably there were several more steps (perhaps four), which led into an upper room. From the southern part of this room, a flight of stairs probably ascended westward over the lower part of the stairs and arrived at the roof north of the third pier west of the corner (Plate 167).

While there is no concrete evidence for this reconstruction of the upper part of the staircase, it seems probable when other possible methods of construction are considered. If the stairs had ascended southward from the corner, they would have cut through the ceiling joists, which would have resulted in great structural weakness. More-

over, some form of supports would have been required and it is highly improbable that all evidence of them would have vanished. It is possible, but even more improbable, that the stairs continued eastward through the east wall of the entrance hall and into an adjoining building on the east. The topmost remaining block of the wall forming the west side of the stairwell was cut away on top at the north end. The cut was 10 or 12 cm. in depth and more than 1 m. in length. Another block which was set in the cut, was badly worn on the top and edge. Since this stone is one step higher than the landing, it must have been a tread leading westward from the landing to another structure, probably a balcony or mezzanine room.

South Side. In the south colonnade, two platforms were constructed, one on each side of the doorway, and were placed 25 cm. north of the bench along the wall. Each measures approximately 1.05 m. in width at the bottom and about 75 cm. wide at the top, the sides having been cut back 15 cm. each. The heights of the lower and upper stages were approximately 15 and 25 cm. respectively. An extension, 1.5 m. long, was added to the western platform. This addition is much later than the original platform; inscribed blocks from the first century A. D. were used in its construction.

Fifteen cm. north of this platform, three stone supports for another bench were found cemented into the floor. They measured 50 cm. high and 33 cm. wide. Judging from their height and spacing, the seat must have measured about 3.5 m. in length and was probably made of wood.

Between the wall bench and the westernmost platform, a three-line boustrophedon bronze dedicatory inscription (MaMB 147 = Jamme 828) was set in the floor, which, at this point, was a few centimeters lower than the normal level of the colonnade floor (in Plate 166 it is located under the sloping stone which was placed there to protect it from damage). The inscription, measuring 1.18 m. long, was inserted between slabs of alabaster-like stone and was intended to be read from the north or platform side. It mentions, among others, a certain Yadi'il, who may be Yadi'il Bayin, one of the early kings of Saba', according to Jamme. In view of this possible identification and of the palaeography of the inscription in particular, Jamme assigns it to the second half of the fifth

century B.C. In all probability, this was not its original location, since the peculiar shape of one edge and a flange with a rivet head at one end were unnecessary at this place.

West Side. Other structures were found in the west colonnade. Near the south corner pier, a sixteen-sided stone drum is cemented into the floor. It measures 34 cm. in diameter and 43 cm. in height; there is a cutting 9 cm. square and 6 cm. deep on the top surface. What this drum supported we do not know.

A wall, of slovenly construction, was built (probably at a late date) between the west wall of the entrance hall and the second pier. It was separated from the peristyle floor by a deposit of sand (ranging in depth from 20 to 40 cm.) upon which its foundations were laid. More ancient blocks, including at least six that were inscribed, were used in its construction.

A large rectangular construction is located in the middle of the colonnade. It occupies the entire floor from wall to piers and measures 2.98 m. long, 2.24 m. wide, and 75 cm. high. Its masonry is smooth-dressed on the outside, rough within. Some inscribed blocks were used in its construction and the top seemed to have been built or repaired later. The blocks which remain of the topmost course are larger than those below and project farther inward, suggesting that this may have been a platform, not unlike the one found in the court near the northwest corner. Since there were hundreds of bronze statuettes and plaques in the entrance hall, the sand filling of the structure was investigated carefully for evidence of bronze casting. Unfortunately nothing was found that would throw light on its function.

At a distance of 1.42 m. north of this structure, a limestone drum, 47 cm. in diameter and 65 cm. high, was found standing on end. The top has been worn down to a concave profile, probably by grinding. The outside surface, which was badly eroded and weathered, was once decoratively carved. At the top edge, there was a molding of astragal type. A few centimeters below there was a fillet, about 8 cm. wide, with narrow vertical flutings spaced about 6 cm. apart cut into the lower two-thirds of its width. The body of the drum was embellished with similar, but slightly wider, flutings which correspond to those on the fillet. Two smooth bands, 18 cm. wide, completed the decoration; one was about one-

third of the way down from the top, and the other was at the bottom.

Nearby, a short section of molding with raised regular panels was found, the top of which was similarly concave.

At a distance of 7 cm. north of the drum, an oven or kiln was discovered, constructed of stone slabs and measuring 90 cm. long, 47 cm. wide, and 47 cm. high. Although it was open at the top when found, it is possible that the original top has been destroyed and that its height was originally somewhat greater. A vent, located in the lower north end, was used for firing. Ashes and charcoal filled the oven and covered all the floor as far as the north corner, a distance of 5 m., to a depth of 5 to 20 cm.

North Side: The north colonnade was also filled with construction (Plates 162, 176). Another rectangular structure, filled with stones and sand, is located opposite the corner pier and against the entrance hall wall. It is 1.22 m. long, 1 m. wide, and 50 cm. high, although it must originally have been at least 25 cm. higher. By its southwest corner, a stone tank was found measuring 56 by 60 cm. outside, 47 cm. high, and 23 cm. deep. There is a drain hole in its south side.

A fragment of an octagonal shaft, 27 cm. in diameter, is built into the floor against the north side of the corner pier. Its top side is badly worn, suggesting that it had been used as a doorsill.

East of the rectangular structure, a small cell was found, the walls of which were built of reused blocks; it is only 1 m. wide inside. Its doorway is near the east end of its south wall; a step, leading down to the doorway, was placed at the end of the colonnade floor.

Inscriptions: To inscribe dedications and to place them in a temple was important in Himyaritic religion and may have reached the proportions of a commercial enterprise at Mârib. No one knows how many inscriptions were removed from the temple in antiquity, but as the excavation of the court progressed, whole or fragmentary inscribed stones were found all through the sand; at the bottom their number was almost overwhelming. The court was virtually surrounded by inscribed stones which were often stacked 2 or 3 high (Plate 177) and sometimes were arranged in double rows. As noted above, a large portion of the court floor was

paved with re-used inscriptions. With the exception of the large, multiple-statue base in the southeast corner, and the bronze plaque in the floor between the bench and the platform on the south side, no inscriptions were found *in situ* in the colonnade. Five inscribed stones were found in the very small area excavated in the oval and many more were discovered in the area north of the triple doors.

Many other dedications were inscribed in bronze instead of stone. Only two bronze inscriptions were found complete and *in situ*, one on the bronze basin (MaMB 302 = Jamme 829), and the other on the plaque (MaMB 147 = Jamme 828). The piers, however, are covered with holes for dowels to which bronze plaques were once fastened, while the walls, although not so densely covered, were by no means entirely bare. The plaques were attached to the stone surfaces by means of projections cast on their reverses. Strips of lead were wrapped around these projections which were then wedged into the holes in the piers or walls by pounding the front of the plaque. In addition to these plaques, many traces of painted inscriptions were found on the walls (e.g., Plate 165). Unfortunately, the red paint, which was used throughout, had faded so badly that no more than a few letters could be read in any group.

Normally, bronze statuettes or statuettes were mounted on inscribed bases, but sometimes the statue itself carried the votive inscription.³⁵ It is probable that the inscribed statues stood on plain bases. No base, either inscribed or plain, was found to fit any of the three bronze statues discovered. Most of the inscribed stones now standing belong to the period after the first century B.C., but a great number of older inscriptions, mostly fragmentary, were found in the sand in the lowest meter and a half above the floor. Their archaic letters and boustrophedon lines show clearly that some belong to an earlier period than the present entrance hall. It is impossible to determine where these older inscriptions had been kept, but that they were preserved for some time is certain. In view of the many fragments that were found within the ruins of the entrance hall, it is clear that they were not discarded when it was built. Nor is it probable

that they were re-used as building material and incorporated in the construction of the entrance hall proper since none was found anywhere in the intact structure. Only later were they broken and used in making repairs and in building additional structures.

This disrespect for ancient votive objects must have appeared rather late in the history of the temple, but before the introduction of Islam. The inscriptions re-used in later constructions were not all early in date and included many from the late period. Moreover, it is scarcely probable that the court floor was paved, or the workshop-like structure in the west colonnade built, after 'Ilumquh ceased to be worshipped, since both appear to have been used for a long time. Similarly, the addition to the platform in the south colonnade in which inscriptions dating from the first century A.D. were used (see above) cannot be understood except in connection with cult practices. The increasingly slovenly character of the later repairs, artifacts, and inscriptions, together with the failure to rebuild the dam after it burst about the middle of the sixth century A.D., suggests that the cultural vitality of the inhabitants of Mârib had deteriorated badly before the conquest of Islam.

DATE OF THE ENTRANCE HALL

It is more difficult to date the entrance hall than the oval wall owing to the fact that no dedicatory and building inscriptions were found in its inner walls. This does not mean that such inscriptions do not exist. The custom of dedicating temples persisted for a number of centuries and for this reason alone we should expect to find them here also. Since inscriptions of this type are found on the outer surface of the oval wall, it is probable that similar inscriptions are located in the unexcavated outer walls of the entrance hall.

In the absence of specific dedications on the entrance hall, we must rely on other evidence to determine its date. We have seen that construction of the oval wall was begun at the ends, on either side of the entrance, which indicates that an entrance must have been standing or planned at that time. Since great skill and careful planning are evident in the design and construction of the oval wall and presumably in the entire

³⁵ See F. P. Albright and A. Jamme, "A Bronze Statue from Mareb, Yemen," *The Scientific Monthly*, LXXVI (1953), pp. 33-35.

complex as well, it is reasonable to assume that the gateway or entrance was perfectly aligned with the ends of the oval wall. Thus, the peculiar orientation of the present entrance (cf. Plates 153, 163, 164) suggests that it does not belong to the original plan of the temple complex, but represents a later addition.

Even stronger evidence for regarding the present entrance hall to be later than the first (or older) platform is the wall at the topological position of the present one. During the technical analysis of the walls in the originally planned structure, the author has suggested that the wall at the top of the platform of the first (or older) platform (Plates 153, 163, 164) was built in the 13th century BC (cf. 163, 164).

The same wall is also visible in the photograph

(Plate 163) taken from the south side of the platform.

It is a thick wall made of large stones, which

has been almost completely destroyed by the

water-worn action of the stream. It is evident

that the wall was built before the platform

was constructed, and that the platform was

constructed later, probably in the 13th century BC.

Thus, the present entrance hall must be later

than the platform of the first (or older) platform.

It is probable that the platform of the first

(or older) platform was built in the 13th century BC.

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Thus, the present entrance hall must be later

than the platform of the first (or older) platform. A small room, an extension to one of the platforms, and rectangular structures of undetermined use were later erected in virtually all sections of the periphery, in some of the expansion. Only the rectangular structures, and the extension to the platform, incised 'names' are found, which indicates that the alteration took place after the 1st century BC. The *Jananī* dedication inscription (Plate 163, 164) found only in the rectangular structures of the floor of the outer platform clearly shows that the platform is of the *Jananī* country. The name 'Jananī' is very important when related to the name 'Jananī' of the *Jananī* people, who are mentioned often in the inscriptions. The name 'Jananī' is also mentioned in the inscriptions of the 1st century BC, and it is evident that the name 'Jananī' is of the 1st century BC.

The name 'Jananī' is also mentioned in the inscriptions of the 1st century BC.

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This wall is quite similar to the short wall beside the stairs in the northeast corner of the peristyle hall (squares N/O 15 in Plate 162). At its south end, it is 61 cm. thick, but since it slightly overlaps the end of the east wall, only 56 cm. of its surface touches the pier. If both piers were as thick as the walls which abutted on the easternmost pier, they must have measured 56 by 67 cm. and were somewhat flatter than those found elsewhere. It is possible that they were not of quite the same width as the walls, but may have been a few centimeters wider or narrower; the difference, however, was probably not great. At least two similar piers on the west may be assumed and possibly one or two more originally continued the row eastward, but were replaced by the wall.

An east-west wall, 80 cm. thick, was located midway between these piers and the eight larger piers farther north; the exact measurements are as follows: 2.25 m. from the south row and 2.12 to 2.18 m. from the north piers. Its masonry is older than that used in the east and south walls (see below); the wall had probably been erected at an earlier date and was rebuilt when the other walls were added in their present form. A doorway was found opposite the central intercolumniation of the large piers which was walled up at a later date. A raised plaster floor extended from this wall to the eight piers at a level approximately 2 m. above the court floor. No evidence of walls was found on this floor. Whether this raised floor was laid over bedrock or over artificially produced fill was not determined.

A rectangular corner room was formed on the north and east sides by the junction of the east-west wall with a north-south wall and on its south and west sides by the two smaller walls which abutted on the easternmost pier. The room had a plaster floor, the level of which (95 cm. above the court floor) was almost midway between the floor of the court and of the portico. A doorway, 96 cm. wide, was located in the south wall, opening out on the end of the long steps east of the court. In order to reach the door, two steps were built on top of and perpendicular to the long steps. The doorway was partially blocked by a wall built on the staircase at a later date. A cutting (22 cm. wide and

3 cm. deep) in each of the wall ends which form the doorway presumably held a door frame similar to those used in the triple doors.

Adjoining this corner room on the west, there is a little room or alcove, which opens on the court. Its floor is about 40 cm. above the court floor; it was reached by a wide step. In the northeast corner of the room, a manger-like structure was found, and in the middle of the west wall, about 1.25 m. above the floor, there is a beautifully constructed rectangular niche. The area to the west of this room was not excavated.

From the east side of the court, a broad flight of five steps leads to a platform at a level slightly more than a meter above the court floor and perhaps 10 to 15 cm. above the floor in the northeast corner room. The south wall of the outer structure (55 cm. thick) was built on the south end of the steps and against the outside of the peristyle wall, covering the false windows. Whether the south wall of the northeast corner room was built on the steps was not determined.

At a later date, a small room with a bench along three walls and a stone table in the center was built on the north end of the platform. The west wall of the room was placed on the middle step of the staircase. Its highest preserved course partially covered the entrance to the northeast corner room and bore a dedicatory inscription (MaMB 311 = Jamme 761) originally in four lines of which the first and most of the second are now missing (Plate 180). On the basis of palaeography, Jamme dates the inscription about the first century A.D., which suggests that the construction of the room on the platform belongs to that period. However, it is probable that the stone is re-used here and only provides a *terminus post quem* for the room. The inscription with large letters on the end stone (MaMB 310 = Jamme 760) is complete, but has no connection with the larger one. In all probability, this wall served only as the back of the seat at the table, the roof having been carried by a small pier which stood above the fourth step midway in the length of the stairs. This pier measured 33 by 31 cm. and was preserved only to a height of about 80 cm. It was placed on a masonry foundation, the top of which was level with the table-room floor.

The stone bench was of limestone and was 33 cm. high; an original alabaster seat, 15 cm. thick, had been removed from its position. The

seat had been cemented to the wall behind, as shown by marks still visible. It was 39 cm. wide on both the east and north sides of the room. On the west side, it was 66 cm. wide, but its back, which presumably was faced with alabaster, had also been removed.

The table top was missing, but probably was of alabaster since that stone was used freely in this area. All that remains are three limestone blocks which served as its supports. The blocks measured 30 cm. high, 54 cm. wide, and 19 cm. thick (except the south one, which was 11 cm.). Since the blocks were placed 62 cm. apart, and foot room of 35 cm. was preserved on each side, the table top must have been at least 1.73 m. long and 54 cm. wide.

The south end of the room opens on to the platform at the head of the stairs. The edge of the table-room floor is alabaster and is raised about 20 cm. above the platform, the floor of which has been destroyed (see below).

A doorway, located in the east wall of the southeast corner of the platform, gives access to the outer area (Plates 180, 181). It measures 58 cm. in width and its jamb reveals and sill are 27 cm. wide; the latter is 25 cm. higher than the platform. Its door opens inward and was secured by two bars, with a maximum thickness of 8 cm., which were located at 29 cm. and 1.11 m. above the sill. When the door was bolted, the ends of the bars fitted into holes, 8 cm. deep, cut in the south wall; when it was open, the bars were pushed out of the way into deep cuttings in the wall immediately to the north, resembling those in the west door of the oval. Much copper oxide was visible around the pivot socket cutting, indicating that there may have been a bronze socket. Although no traces were found on the sill, copper oxide also appeared on the stone floor in front of the sill, suggesting that the platform floor may also have been covered with bronze, at least as far as the doorway recess. The fill beneath the platform floor was composed of sand and rough stones.

The outer area, east of the doorway and north of the peristyle hall, was originally paved with stone, but most of the paving has been destroyed. At a distance of 45 cm. north of the doorway and against the east wall, a drain was found enclosed by a stone frame which extends several centimeters above the floor. It is located nearly opposite and about 1 m. above the drain from the

doorway of the temple entrance which disappears under the table room. Whether these drains entered a sewer beneath the platform, which carried the water off to the north, is not known.³⁸

At the south end of the paved area, a stone bench, 40 cm. wide and 55 cm. high, was built against the outside of the peristyle hall after the construction of the outer area walls. Various holes in the top and front edge of the seat indicated that the stones had previously been used as statue bases. While used as a bench seat, they were worn smooth. The bench extends from the outer area wall to the corner of the peristyle hall, a distance of 2.63 m. At the corner, it is set back 15 cm. and then continues eastward along the wall of an adjoining (unexcavated) building.

Although only the top sand was removed along the west end of the court, a wall was discovered, built against the outside of the peristyle hall and corresponding to the one on the east. It began 55 cm. from the western edge of the triple doors, extended 2.73 m. (inside measurement) along the wall of the peristyle hall, and turned north like its eastern counterpart. Although no more than the top of this corner was cleared, it was sufficient to show that there was no doorway in this corner like the one found in the corresponding corner on the east side.

MASONRY OF THE OUTER STRUCTURES

As noted above, a common technique of wall dressing was used in both the oval wall and the peristyle hall. By the time the outer structures were built, however, the technique had changed. After the wall was constructed, the blocks were smoothed down vertically, leaving a series of vertical striations which give a sawed effect. The joints received no special treatment. The margins on either side were not drafted and can be distinguished from the central area of the block only by the fact that they are not pecked. These margins are also broader than they were in the earlier period. The centers of the blocks were pecked in a horizontal direction, but the pecking was so sparse that vertical striations are always visible.

Two types of chisel were used for the pecking. One, probably a chisel with three or four points,

³⁸ At Khôr Maghseil in Dhofâr, Oman, the water from an ablution system was conducted under a structure resembling a platform where it soaked away in the ground.

made elongated furrows about 4 mm. long. The other, consisting of a single point, produced a square hole, deeper on one side than the other. There seems to be no difference in the date of the two chisel types.

THE EIGHT PIERS

The eight large piers are located 12 m. north of the peristyle hall and from 2.12 to 2.18 m. north of the outer building wall (see above). They form a line 11 m. long and their central axis, like the axis of the whole outer area, is oriented about 30 cm. east of the central axis of the peristyle hall. They are spaced at an average distance of 1.376 m. between centers or 86.6 cm. between edges, except for the two center piers which are 1 m. apart.

Their size ranges from 75 to 77 cm. north-south and from 68 to 70 cm. east-west. They reach a height of 7.65 m. above the floor giving a ratio of 1 to 10. Whether they extend below the portico floor was not determined. Judging from the large part already cleared, all the piers were monoliths. At least one was broken, but the break was quite square and the upper section rested solidly on the lower. On the top of each pier, there was a square tenon for securing the entablature.

ENTABLATURE (PLATE 169)

None of the entablature remained and to reconstruct it with the available material is difficult. Elsewhere in South Arabia, there are several examples of piers that apparently stood before temples, but nowhere is any part of the superstructure preserved. The temple *Rasf* of 'Athtar near Qarnaw on the plain of Ma'in is a possible exception, but since the structure is somewhat different, it contributes little to the solution of the problem.³⁹ The remains at 'Awwām are probably the best source of information on the nature of the entablature.

The relative size of the piers is important for this reconstruction. The architects of Saba' had

confidence in their materials and a good empirical knowledge of stress and strain. They did not select the sizes of columns and piers arbitrarily, but balanced carefully the nature of the material, the height to be attained, and the distance to be spanned by supporting beams. An example will illustrate their advanced knowledge of materials and stress. The same man, Yadi'il Dhirrih, was responsible for both the large outer line of piers at 'Awwām and those at Ḫirwāh. At 'Awwām, where limestone was used for the piers, their height was 7.65 m. and their width was 69 cm. But at Ḫirwāh, where granite was employed, the piers reached a height of 8.50 m. and were only 67 cm. wide. Since an orderly process was followed in determining the size of the piers, by reasoning from known dimensions and considering the above factors, the unknown elevation of the entablature can be reconstructed with reasonable certainty. The sizes of the 'Awwām piers are given in the following table. To establish ratios, the length and the greatest thickness of the piers have been used. Assumed or estimated figures are underlined.

Eight Piers (avg.)	69 by 76 cm. by 7.65 m.	Ratio: 1 to 10.06
Outer Area (missing)	<u>56</u> by <u>67</u> cm. by <u>6.30</u> m.	<u>1 to 9.4</u>
Pier fragment on east stairs	31 by 33 cm. by <u>3.30</u> m.	<u>1 to 10</u>
Peristyle hall (n-s)	46 by 53 cm. by 5.30 m.	1 to 10
(e-w)	39 by 45 cm. by 4.95 m.	1 to 11
Mausoleum (& capital)	37 by 46 cm. by 4.20 m.	1 to 9.13

The mausoleum piers presumably had a lower ratio because they had to support heavy beams to span the relatively long distance from pier to wall. The estimated low ratio for the widely spaced piers in the outer area suggests a similar span, and we may assume that the roof carried by these piers was level with that of the peristyle hall. Probably a low ratio must be assumed for the single pier on the wall of the table room in view of the relatively long spans of 1.81 and 1.88 m. The 1 to 10 ratio is based on the average ratio of other piers and the height of 3.30 m. is similarly derived. This height would bring the roof more than a meter above the outside windows of the peristyle hall and probably into the upper row of recessed windows or depressions. While this would spoil the outer appearance of the peristyle hall for us, there is no indication

³⁹ Fakhry, *op. cit.*, III, Pl. LIX. See also H. von Wissmann, "Geographische Grundlagen und Frühzeit der Geschichte Sudarabiens," *Saeculum*, IV (1953), p. 79, Figs. 9, 10.

that the later architects who built this addition had any consideration for the form of the adjacent building. In any case, with the material discovered, it would be difficult to reconstruct this roof at the height of the adjoining roofs.

The height of the walls is also important in reconstructing the entablature. The walls of the peristyle hall measure less than 80 cm. in thickness with the exception of the north wall which, for unknown reasons, was 1.62 m. thick. The east and west walls, with an approximate thickness of 74 cm., reach a height of 4.95 m. The wall located south of the eight piers measures 80 cm. in thickness and probably stood 9.65 m. high above the court floor. It is improbable, therefore, that the wall 67 cm. thick extended higher than the peristyle roof and that the wall 55 cm. thick reached as high as the contiguous north wall of the peristyle hall.

The construction of the roof and ceiling was in all probability similar to that of the peristyle and the mausoleum. Heavy joists, carrying the stone roofing slabs, rested directly on the piers and on the 80-cm.-thick wall. The same construction was probably used on the south side of the wall except that the north end of the joists was presumably embedded in the side of the wall, since the wall extended 3 m. above the roof to the height of the large piers. If the walls had parapets or copings, the embedding of the joists in the walls would have been necessary everywhere.

DATE OF THE OUTER STRUCTURES

There can be no doubt that the structures to the north of the entrance hall were built after the entrance hall was completed, although they cannot be dated precisely with the information at hand. Several building phases were observed which can be arranged in a chronological sequence. Many of the constructions can be assigned to their proper phase, but some defy classification without additional evidence. We are also unable to determine the time intervals between the various phases, and they may vary in length from a few years to a century or so.

That the entire area north of the peristyle hall had been planned differently in an earlier period is shown by the position of the false windows. Although the outside windows were 70 cm. lower

than those on the inside, they were the same height above the outer court floor as the inside windows were above the peristyle floor. It may be assumed, therefore, that the area covered by the broad stairs on the east side was open and level at an earlier time. Our only direct chronological evidence for the present structures is the broken four-line inscription in the west wall of the small platform room which belongs to one of the last building phases. This inscription is dated about the first century A.D., but whether it is in its original position or is re-used here is unknown. In any case it proves that this construction and the phase to which it belongs can be no earlier than the first century A.D. and may be somewhat later.

The date of the erection of the eight large piers remains uncertain. It is possible that they were set up when the outer structures were added. If they were erected earlier, their architectural connection is obscure. It is not impossible that they were standing before the present peristyle hall was constructed;⁴⁰ but no evidence has been found to support this suggestion. Perhaps further excavation in the area of the outer structures will clarify their relationship to the entrance hall and the temple; until that time, it must remain an open question.

THE MAUSOLEUM

Four piers on the east side of the oval wall, which still projected above the sand and formed a square, proved to mark the site of a beautifully constructed mausoleum (Plates 182-185). It is oriented almost exactly with the long axis of the oval, 112°-292°, and its northwest corner touches the temple wall. The structure, which is almost square, measures on the outside 8.34 m. east-west, by 7.73 m. north-south, and on the inside 6.25 m. by 5.64 m. A door, located near the center of the north façade, provides the only means of entrance. In the center of the building, four piers with capitals supported the roof. On the inside, the walls are lined with tiers of burial

⁴⁰ M. Höfner, "Forschungen in Südarabien von 1936 bis 1952," *Archiv für Orientforschung* 16 (1953), p. 363.

chambers and there are at least two tombs under the floor.

The construction of the walls is similar to that of the temple oval and the entrance hall. The thickness of the west wall, the north end of which was built against the temple, is 1.10 m., of the south wall 1.11 m., of the east wall 1.30 m., and of the north wall 98 cm. At irregular intervals, headers bond the wall faces together.

A doorway extends through the north wall as far as the inner edge of the platform; it measures 92 cm. in width and its projecting jambs are aligned with the central piers. Like those in the entrance buildings of the temple, the doorway is constructed with setbacks designed to hold the door frame.

The four rectangular piers supported the roof. They measure 46 cm. east-west by 37 cm. north-south and reach a height of 3.60 m. Including the capital in the height, the ratio of the greatest thickness of the shaft to the height is 1 to 9.13. A small tenon on the top of each pier secured the capital. A capital was found near the southeast pier from which it had probably fallen (Plate 186). Its dimensions are 60 cm. high, 37.5 by 46 cm. at the bottom, and 42 by 51 cm. at the top. There is a cutting 7 cm. square in both the top and the bottom. The capital is decorated with a fillet, 10 cm. high, at the top, two rows of overlapping raised tegular panels immediately below, and a broad band, 23 cm. wide, at the bottom. The fillet and the bottom row of raised tegular panels are vertical; while the top row slants out toward the bottom and the bottom band tapers down toward its base.

A complete granite joist, 2.46 m. long, was found in the sand just above the floor (Plate 187). Originally it spanned a distance of 2.10 m., from the southwest pier to the south wall. Twenty-one cm. of one end covered half the capital and 15 cm. of the other end rested on the wall. The joist was 56 cm. wide and 31 cm. thick. A ledge, 16 cm. wide and 31 cm. deep, is cut out of the top edge to support the ceiling slabs. There is a tenon, 10 cm. square and 8 cm. long, on the end of the joist that rested on the pier; presumably it fitted a mortise, cut out of the next joist. There is no evidence that the joist was secured to the top of the capital; a small hole in the latter must have served to facilitate handling.

The floor (Plate 188) was found *in situ*. Its

construction is similar to that of the ceiling. The underground tomb chamber in the northwest corner provides an excellent opportunity to study its construction from below. Four east-west joists were used; two were laid on the north and south walls and two spanned the chamber. The joists measure approximately 35 cm. wide and 25 cm. thick. The upper corners are cut away to form ledges, which carried the limestone flooring slabs; these cuttings vary from 6 to 8 cm. in width and from 8 to 10 cm. in depth.

The piers rested on the intersections of four walls, two north-south and two east-west, three of which formed two sides of the two chamber tombs (Plate 182). The intramural space (excepting the tomb chambers) was filled with sand and apparently the floor was laid directly on the sand between the walls.

Compartments

The compartments are constructed of well-dressed limestone. A platform, 20 cm. high and 80 cm. wide on the north, east, and west sides, and 83 cm. wide on the south side, extends along the walls of the room. Partitions, measuring from 15 to 20 cm. in thickness, were erected on the platform, but were not secured in any way. Cover slabs, which also served as the floors of the compartments above, spanned from partition to partition around the room. Succeeding tiers were constructed similarly with partitions directly over those below (Plates 184, 185).

Each tier contained ten compartments, three on the east, south, and west sides, and one on the north side west of the entrance. East of the doorway, the platform was only 92 cm. long; although this last might possibly have supported a series of chambers for infant burials, this is improbable since no trace of compartment construction was found.

The compartments vary in length from 1.38 to 1.79 m., but all were 68 cm. wide. The width of the floor slabs ranges from 79 to 83 cm. depending on the amount of space required at the front edge for the vertical closing panels, normally 12 to 15 cm. The lowest slab was 15 cm. thick, but fragments of others were several centimeters thinner. On the upper or floor side of each slab, a rim 1 cm. high extended around the edge.

The height of the compartments in each tier was uniform; it varied, however, in succeeding tiers. That of the lowest tier is 63 cm. while in the second tier it is only 60 cm. The discovery of an almost complete panel, which measured 46 cm. high and was used to seal off the entrance, indicates that the height of the compartments diminished at higher levels, assuming that the compartments were closed completely by the panels. If the walls were covered with compartments from floor to ceiling, a height of 4.20 m., there would have been 6 tiers of chambers; with 10 compartments to each tier, there would have been at least 60 burial chambers in the mausoleum.

Near the front edge of each partition, a vertical groove was cut (about 4 cm. wide and 3 cm. deep) to receive a closing panel. Since the panels were 8 cm. thick, their ends were notched to allow their insertion into the groove. Because of the overhang of the cover and base slabs above and below, it was impossible to slide the panel into the grooves from either the top or bottom. Each panel was made, therefore, in 2 pieces, inserted from the front, and joined with a lap joint about 8 to 10 cm. wide. Unfortunately, no closing panels were found *in situ* and only a few fragments were discovered in the course of the excavation, but they were sufficient to prove that the names of the interred were inscribed on them.

The front edges of the end pieces were decorated with a "grill" design at the top and four or five parallel vertical grooves below, broken into short sections.⁴¹

Underground Chambers

In the northwest corner of the mausoleum floor and west of the northwest pier, an opening was found which served as the entrance to an underground tomb chamber. The cover slab was not in place when the entrance was cleared, but was found later in the chamber. The tomb was excavated completely; it measured 2.53 m. north and south, 1.54 m. east and west, and extended

⁴¹ Similar decoration with two grooves was found at Hureidha, see G. Caton Thompson, *The Tombs and Moon Temple of Hureidha (Hadramaut)* (Oxford, 1944), Pl. xviii, 1.

3.30 m. below the mausoleum floor. The chamber floor was formed by the rough bedrock leveled off with cobblestones. There was a ledge, 39 cm. high by 30 cm. wide, along the east wall and another, only 5 cm. wide, on the opposite side, but it is likely that these ledges were part of the foundation rather than structures built especially for use in the room.

Objects mixed with sand and debris were found through most of the grave, indicating that it had been badly disturbed, probably more than once. Parts of a skeleton, including a large fragment of an adult skull, were found in the mixed debris, but whether they were the bones of the original occupant of the tomb or not we do not know. Many artifacts were discovered, including a pithos rim inscribed with archaic letters (no. 102), several incense burners, one of bronze, and many sherds of very poor pottery. A gold globule from a piece of jewelry was found on the floor.

A corresponding chamber tomb was discovered in the southwest corner of the mausoleum and was more than half excavated. The contents of this tomb were also mixed, but more bones came to light in the area excavated than in the entire northwest tomb. A fragment of a limestone sarcophagus was also found (no. 161).

Possibly there are two more chamber tombs, under the south and east sides; if so, their proportions must be different because the construction under the floors in those areas was not symmetrical.

Although the form of burial is the same, the plan and construction of this mausoleum is quite different from that of the Qatabanian tomb structures at Ḥeid bin 'Aqil in Wadi Beihān.⁴²

Two closing panel fragments contain important evidence for dating the mausoleum. One was inscribed with the name *smh'ly/y[nf]* (Sumhu-'alay Y[anaf]) and the other with *[yt']mr/byn/bn/ykrbmlk/wtr* ([Yithi']amara Bayyin the son of Yakrubmalik Watar). These were two of the three kings in the service of whom Tubba'karib probably built the entrance hall and inscribed (Glaser 481 = Jamme 550) on the oval wall (see above). In view of these inscriptions and the similar architectural style and workmanship, there can be little doubt that this mausoleum

⁴² G. W. Van Beek, "Recovering the Ancient Civilization of Arabia," *The Biblical Archaeologist*, xv (1952), pp. 13 ff., Fig. 9.

was contemporary with the entrance hall and also belongs to the second half of the fifth century B.C.

The area to the north and south of the mausoleum seems to have been open. Contiguous to its east side, another structure was found whose north-south dimension was the same as that of the mausoleum. Its north and south walls, however, were turned at an angle of about 10° to the north. No further investigation of this building was made.

SOUTH TOMBS (Plate 189)

A small clearance was made in an area about 100 m. south of the mausoleum. Several walls appeared at the surface and a heavy fill, which gave added prominence to the area, dropped off along an almost straight line extending east and west. A great many sherds, predominantly Islamic in date, were strewn about the surface. It was believed that the quantity of sherds and the visible wall remains might mark the site of a domestic quarter and that the falling away of the fill might indicate the location of a precinct wall.

The structures in the fill, however, proved to be tombs rather than houses and the supposed precinct wall was simply the south wall of a row of tombs. The tombs ranged in size from 1.30 m. by 2.10 m. to 2.65 m. by 3 m. and were built either individually or in very small blocks.

An east-west street, 1.70 m. wide, separates the tomb structures into a northern and a southern row. At its eastern end, it joins another street extending northward from the south wall and measuring 1.35 m. in width. Apparently a second north-south street was blocked by the construction of tombs *e*, *f*, and *h*.

At a later date, a series of roughly constructed walls, which probably served as houses, was added against the south wall of the tomb complex and some of the tombs were re-used as dwellings. They were crudely remodeled at the top and doorways were broken through the walls in a careless manner. No indication of either floor or street levels was found. The door of room *k* was approximately 1.50 m. lower than

that of room *d*, and the entrance to room *a* was about midway between. Several test soundings were dug to a depth of more than 2 m. without reaching the bottom of either the walls or the street.

These tombs were constructed of volcanic cinder blocks and faced with limestone on the street sides. The facing was good ashlar, similar to that used in the temple, but without drafted margins and pecked centers. On the street sides, the walls were built with 3 cm. offsets in successive courses resembling the constructional technique in the lower courses of the oval wall (see above), as well as the temples at Huqqa and Yeha.⁴³

A painted boustrophedon inscription was found on the street-side wall of the southeast tomb (MaMB 315 = Jamme 682). The script is very archaic with forked top H and H⁴⁴ and is assigned to about the eighth century B.C. by Jamme. The tombs, therefore, must go back to that period or slightly earlier.

The tombs have been plundered many times as shown by the disorder of their contents. Small fragments of bones, probably human, were found in several tombs, especially in tombs *c* and *d* where the deepest soundings were dug. The artifacts primarily consisted of fragments of pottery, beads, and other bits of jewelry.

These tombs resemble those found at Timna', they are of approximately the same size and are arranged similarly on each side of a central passage. They differed from the Timna' tombs, however, in the type of building material used.⁴⁵

THE TEMPLE BAR'ÂN

The temple Bar'ân must be mentioned in connection with the Mârib remains although no excavating was done at the site. This temple, which was dedicated to 'Ilumquh, is known

⁴³ Rathjens and von Wissmann, *op. cit.*, pp. 69 f. and Fig. 34a.

⁴⁴ Similar to that of group A in W. F. Albright's classification. See W. F. Albright, "A Note on Early Sabean Chronology," *Bulletin of the American Schools of Oriental Research*, no. 143 (1956), pp. 9 f.

⁴⁵ Van Beek, *op. cit.*, Fig. 8.

locally as el-Amâyid (Plate 190). Five complete piers and a part of a sixth are standing. They are rectangular and measure 50 by 60 cm. in width and thickness. Although no exact measurements were made, if we base our assumptions upon the estimates of Glaser and Jamme,⁴⁶ the complete piers reached a height of about 6.50 m., yielding an approximate ratio of 1 to 10. The lower part of the sixth, located at the northwest end of the row, is preserved only to a height of about 2 m. Apparently it had been covered with sand until quite recently, since it was not reported by earlier visitors to the site. Its exposure was probably brought about during the recent removal of building material from surrounding structures, which permitted the sand to be swept away by the wind.

A two-line inscription was found on the northwest side of this pier which gave both the name

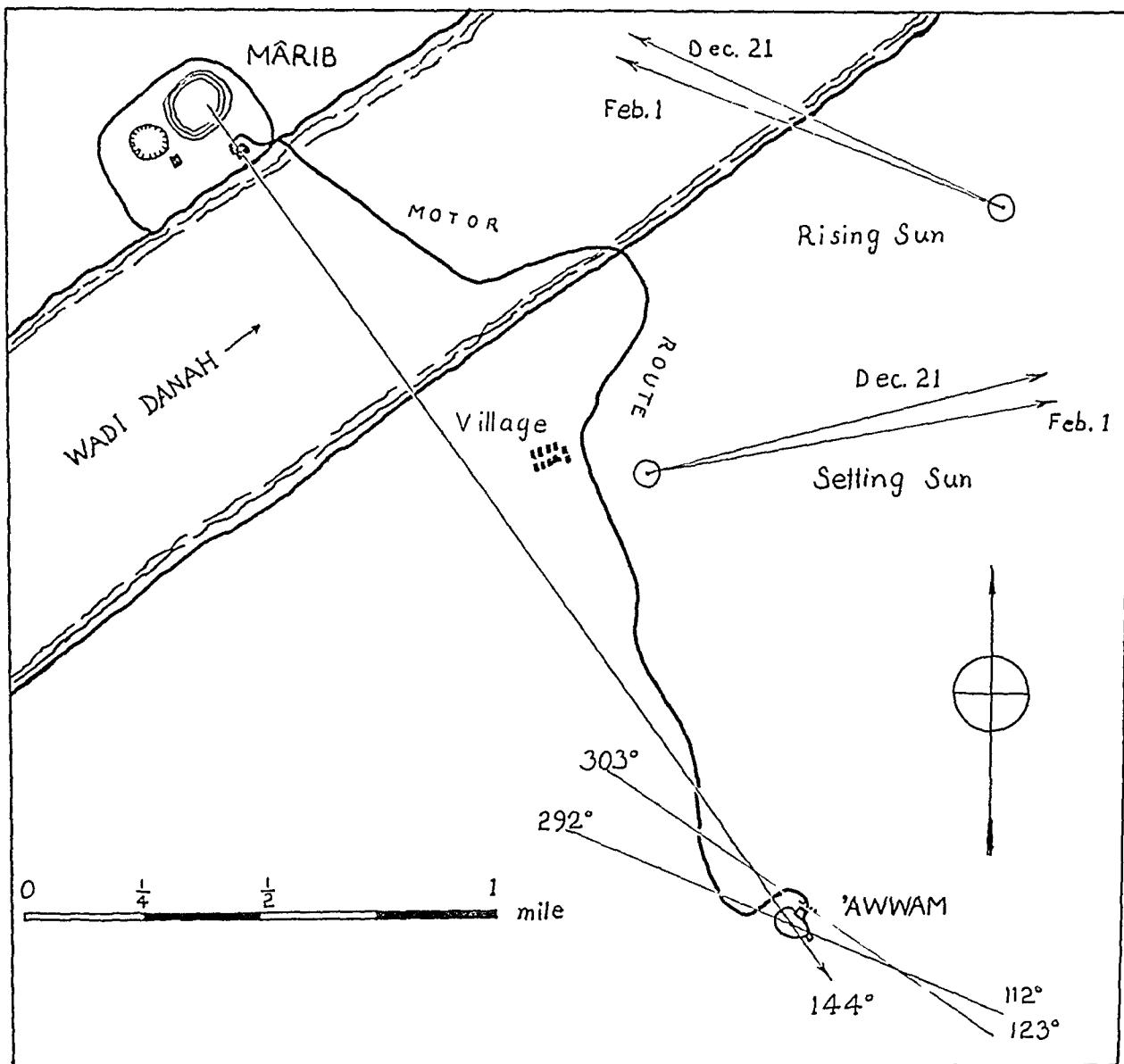
⁴⁶ Jamme, *op. cit.*, p. 295.

of the temple and its deity, 'Ilumquh.⁴⁷ The location of the inscription on the northwest side suggests that the shaft probably stood at the end of the row. Since there is no evidence that other piers stood at the opposite end, it is probable that there were only six.

The five complete piers are surmounted by capitals which appear to be part of the monoliths. The capitals are decorated with three rows of large raised tegular panels alternating with three narrow bands. The tegular panels are arranged in rows of 3, 4, 3.

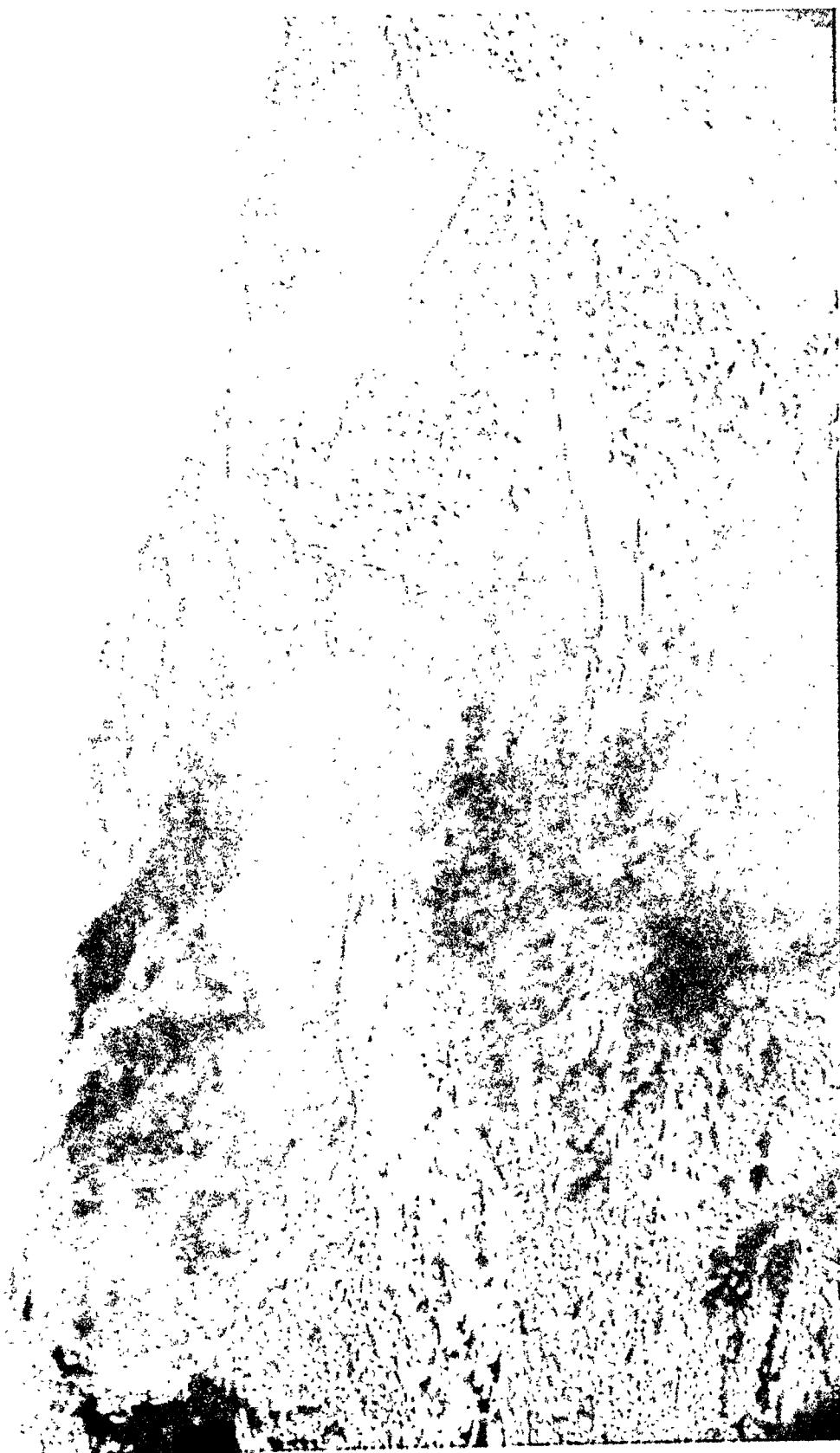
A low area of ruins on each side of the piers marks the locations of two small buildings. Assuming that the piers stood in front of the temple, it is uncertain which structure was the actual temple. The remains of the southwestern building are more extensive, which suggests that this is the probable site.

⁴⁷ MaA3 = Jamme 534. See A. Jamme, "Inscriptions de al-Amâyid à Mâreb," *Le Muséon*, LXVIII (1955), pp. 317 f.

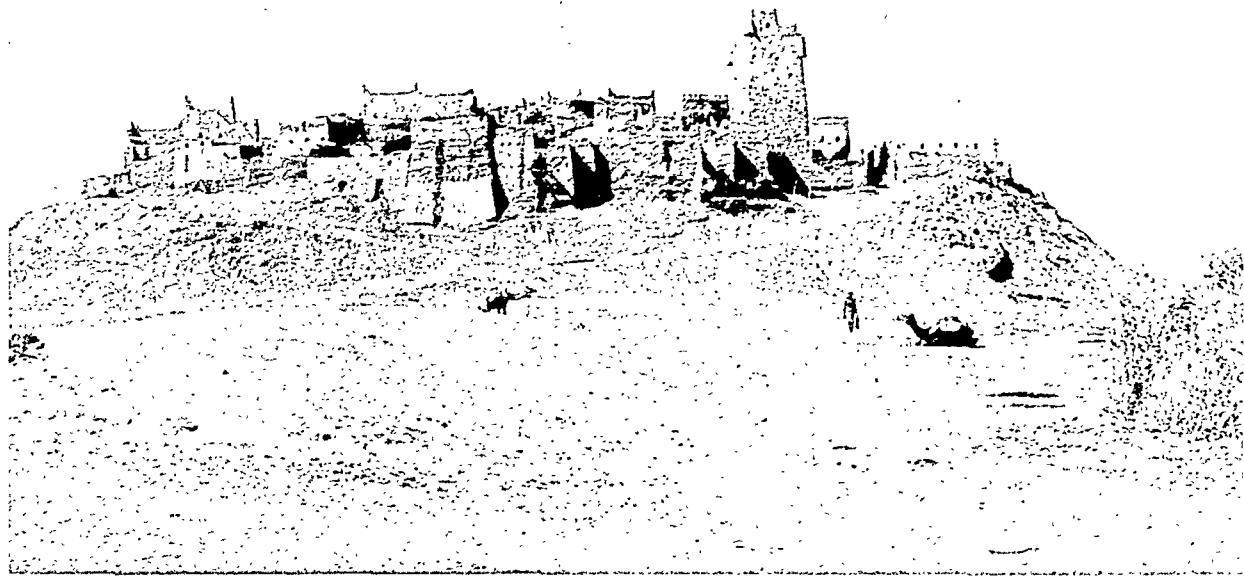


148. Sketch plan of the area showing the location of the temple 'Awwâm in relation to Mârib.

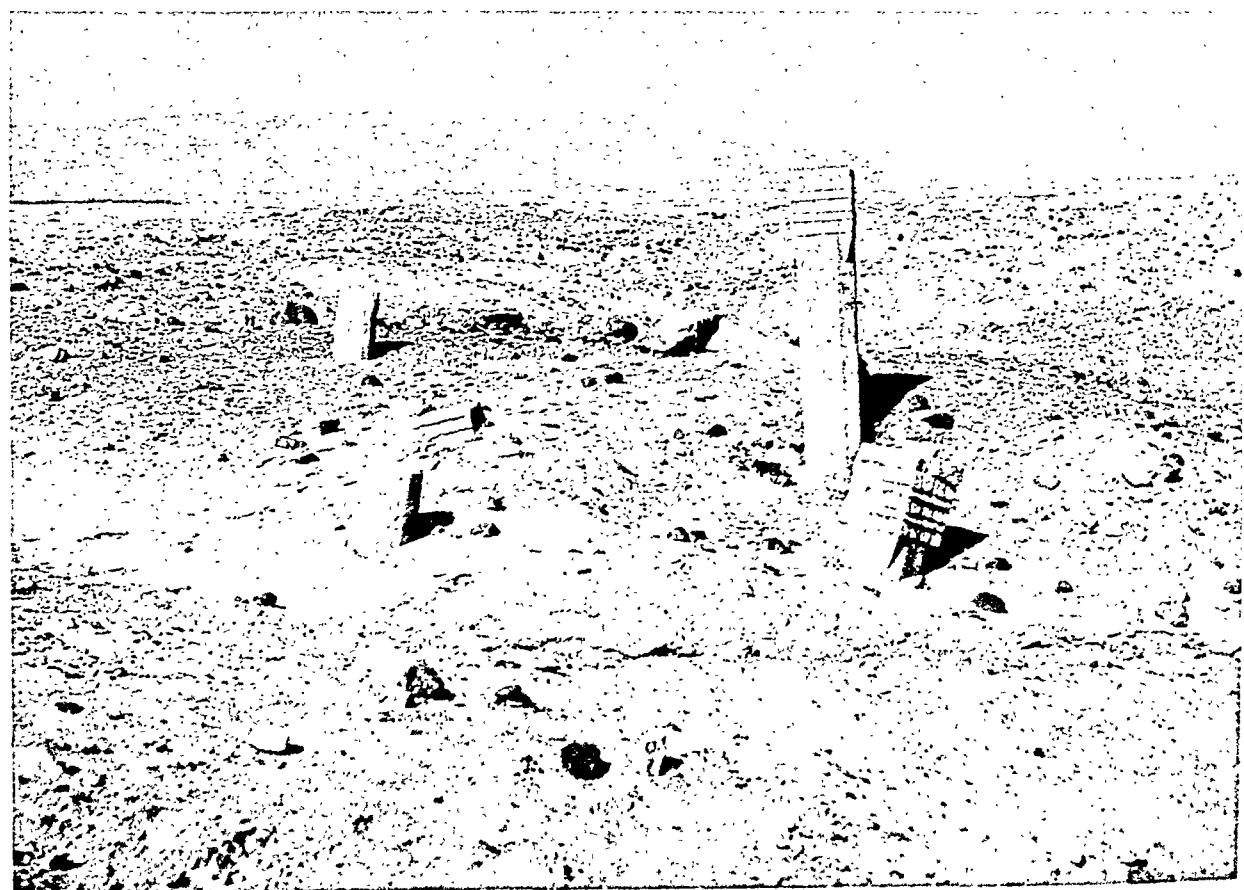




150. Eroded area exposing the stratification of the Marib mound.



151. Modern Mârib, from the northeast.



152. Exposed columns in the ruins of ancient Mârib.

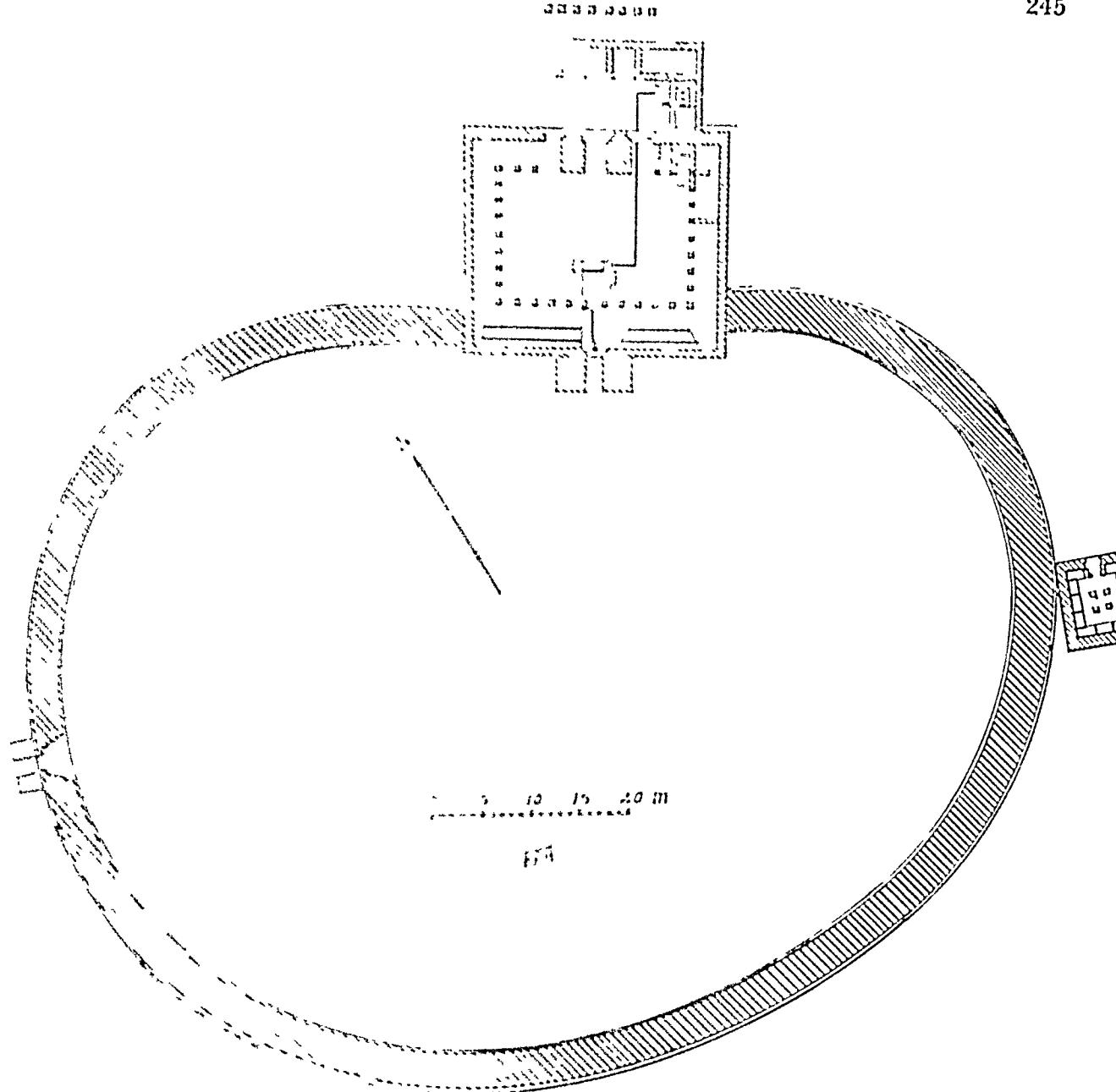
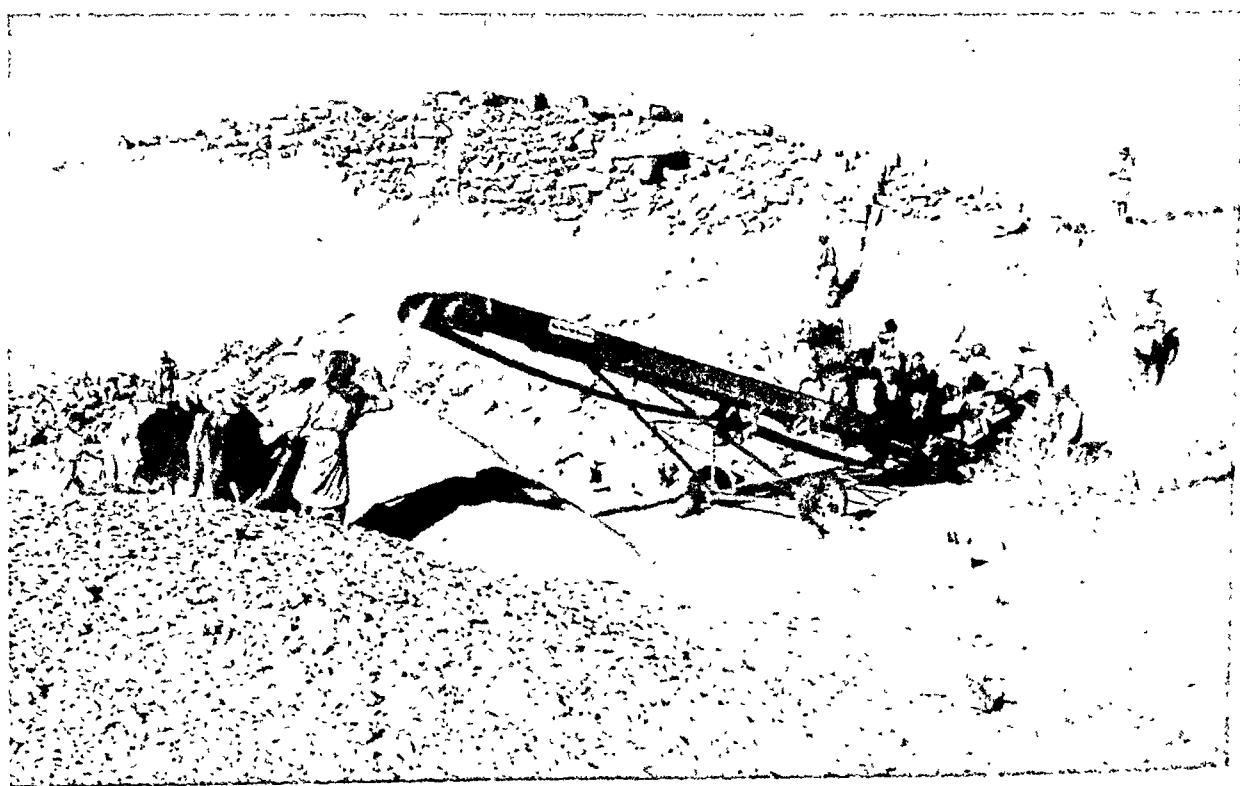


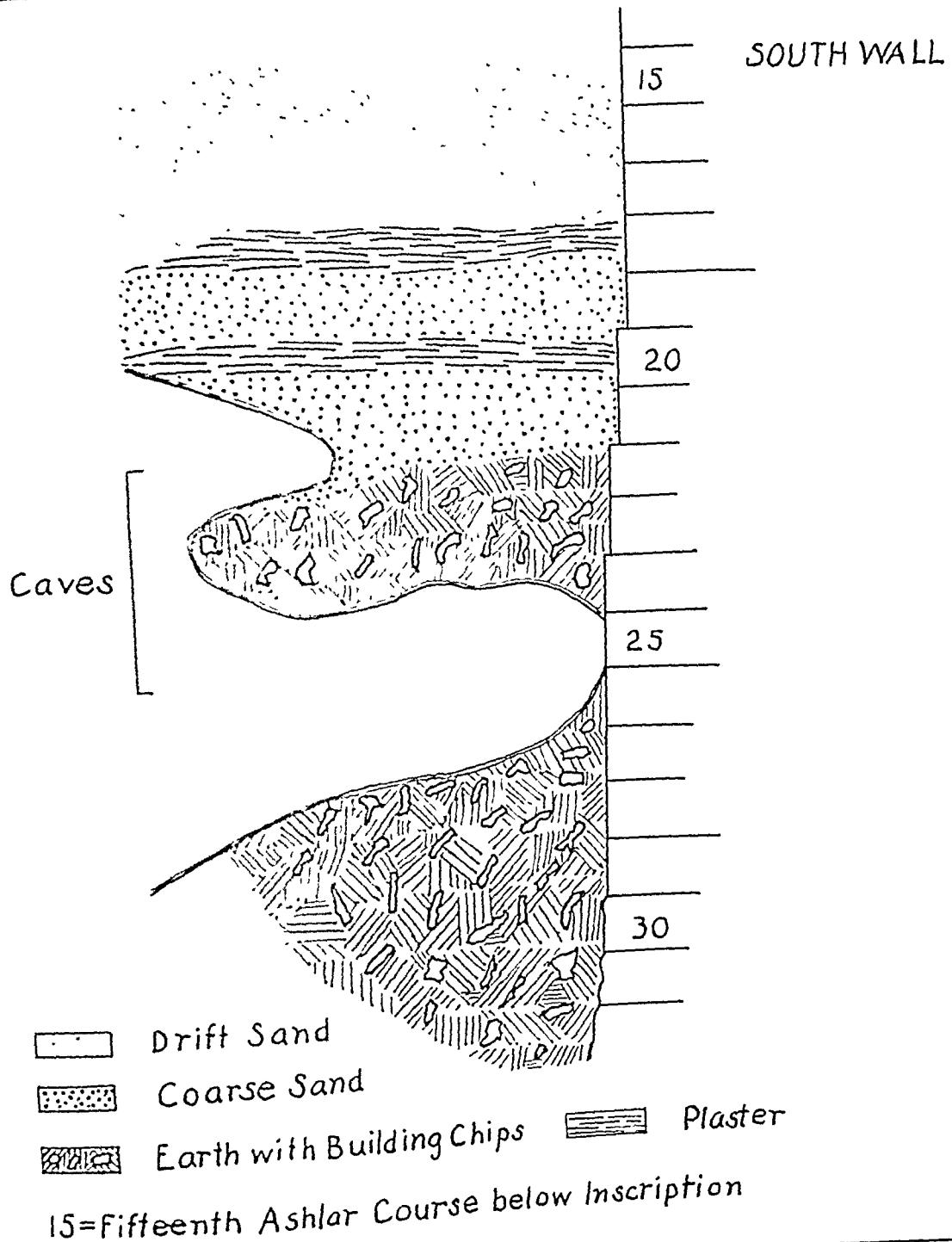
FIG. 1. Plan of temple 'Awwādīm.



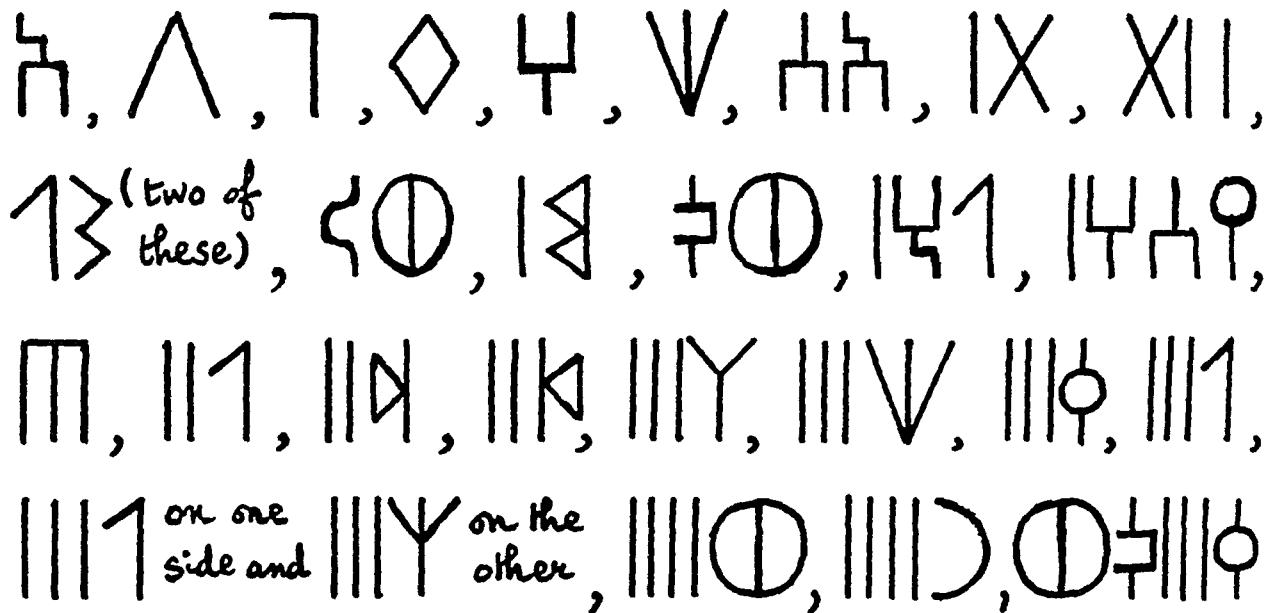
154. Temple 'Awwām from the east showing the four piers of the mausoleum and the eight piers in front of the entrance hall, before excavation.



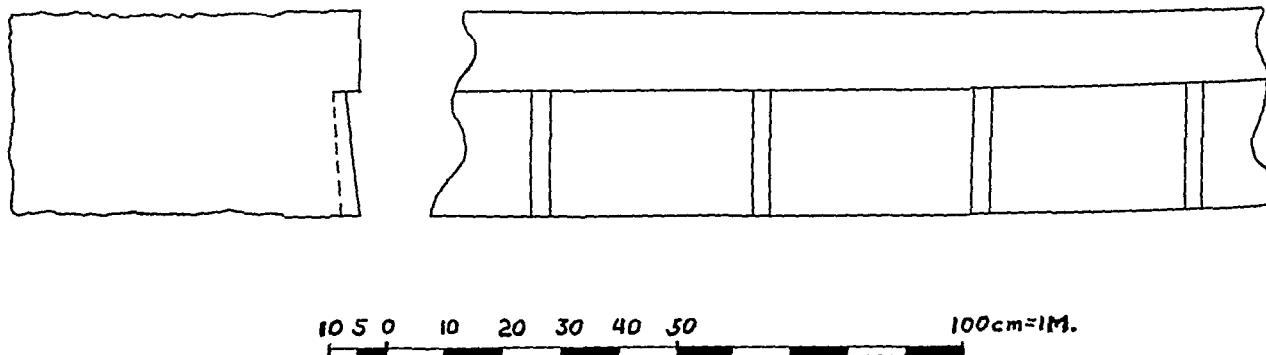
155. Excavating the south side of the oval wall.



156. Section of the debris against the south side of the oval wall.

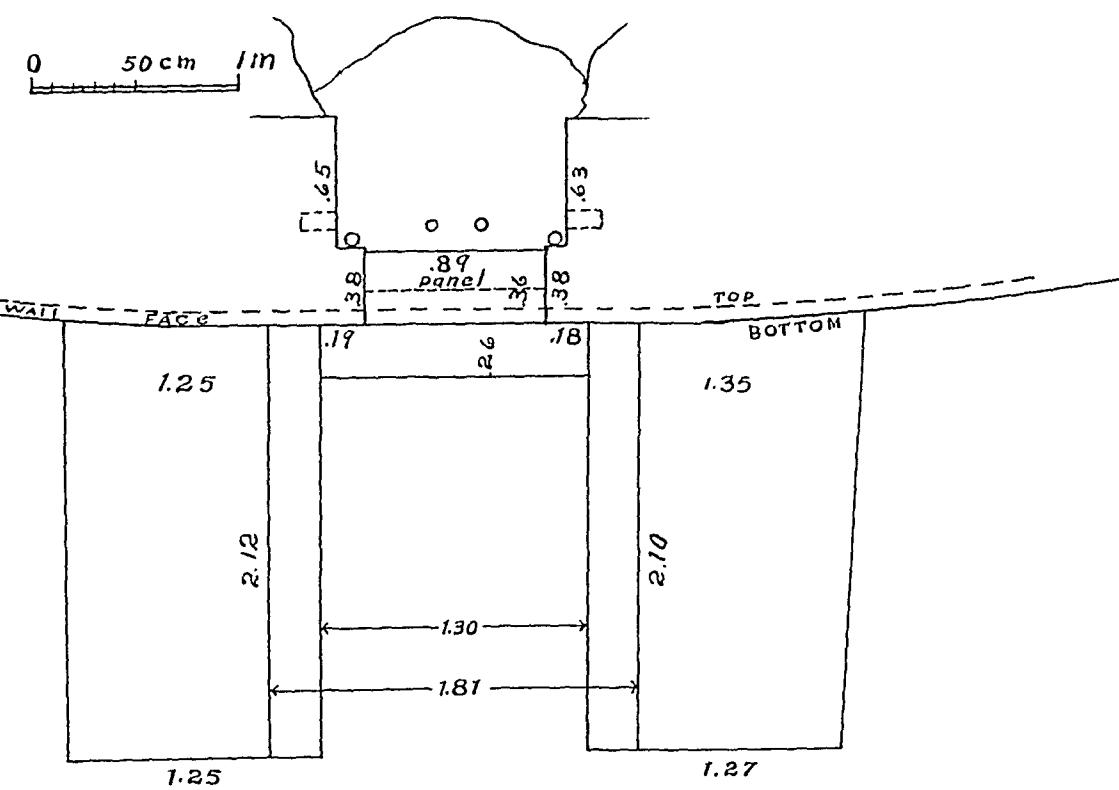
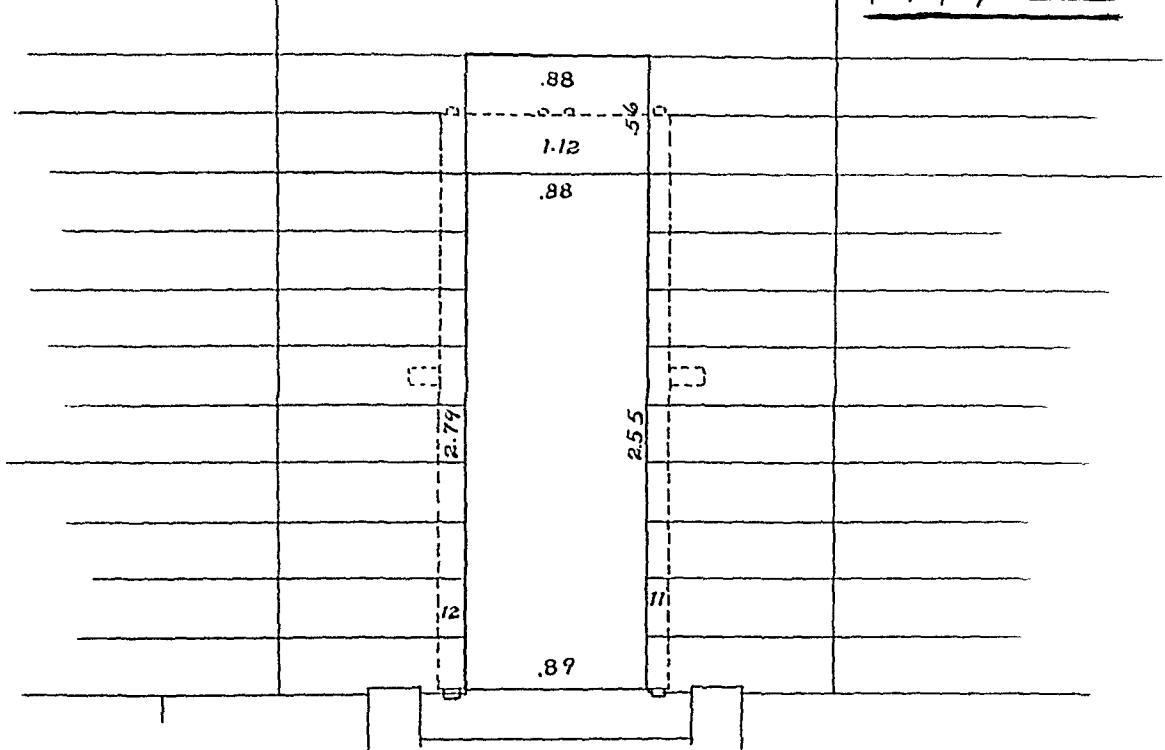


157. Masons' marks from the oval wall and entrance hall (drawing by A. Jamme).



158. Block with molding of raised tegular panels.

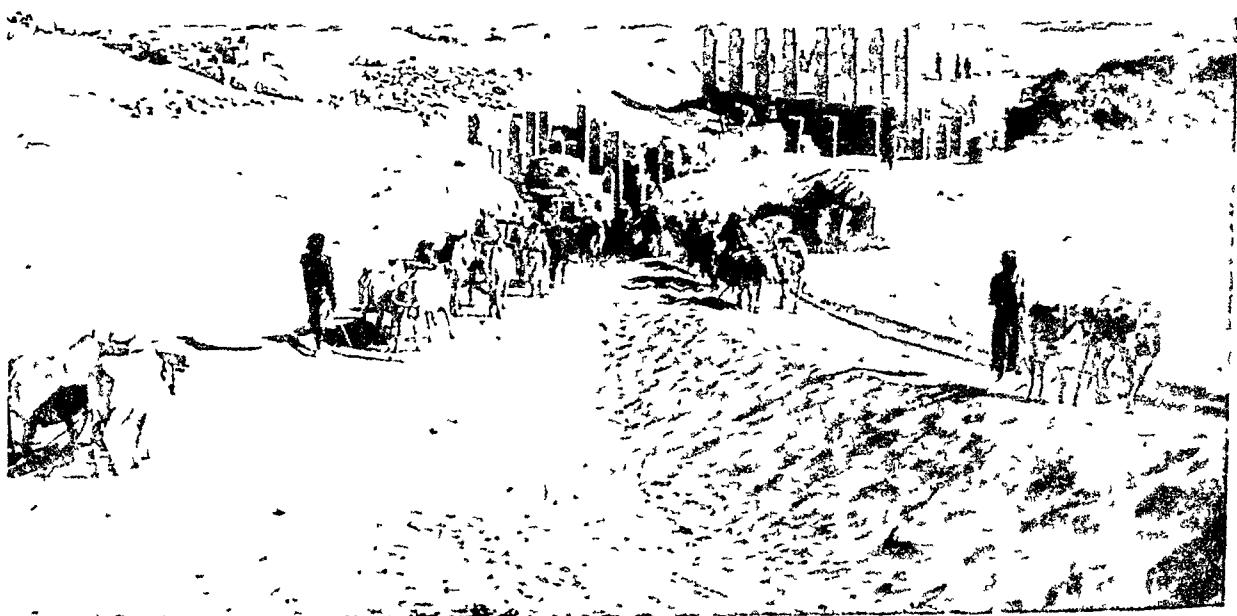
INSCRIPTION
INSCRIPTION



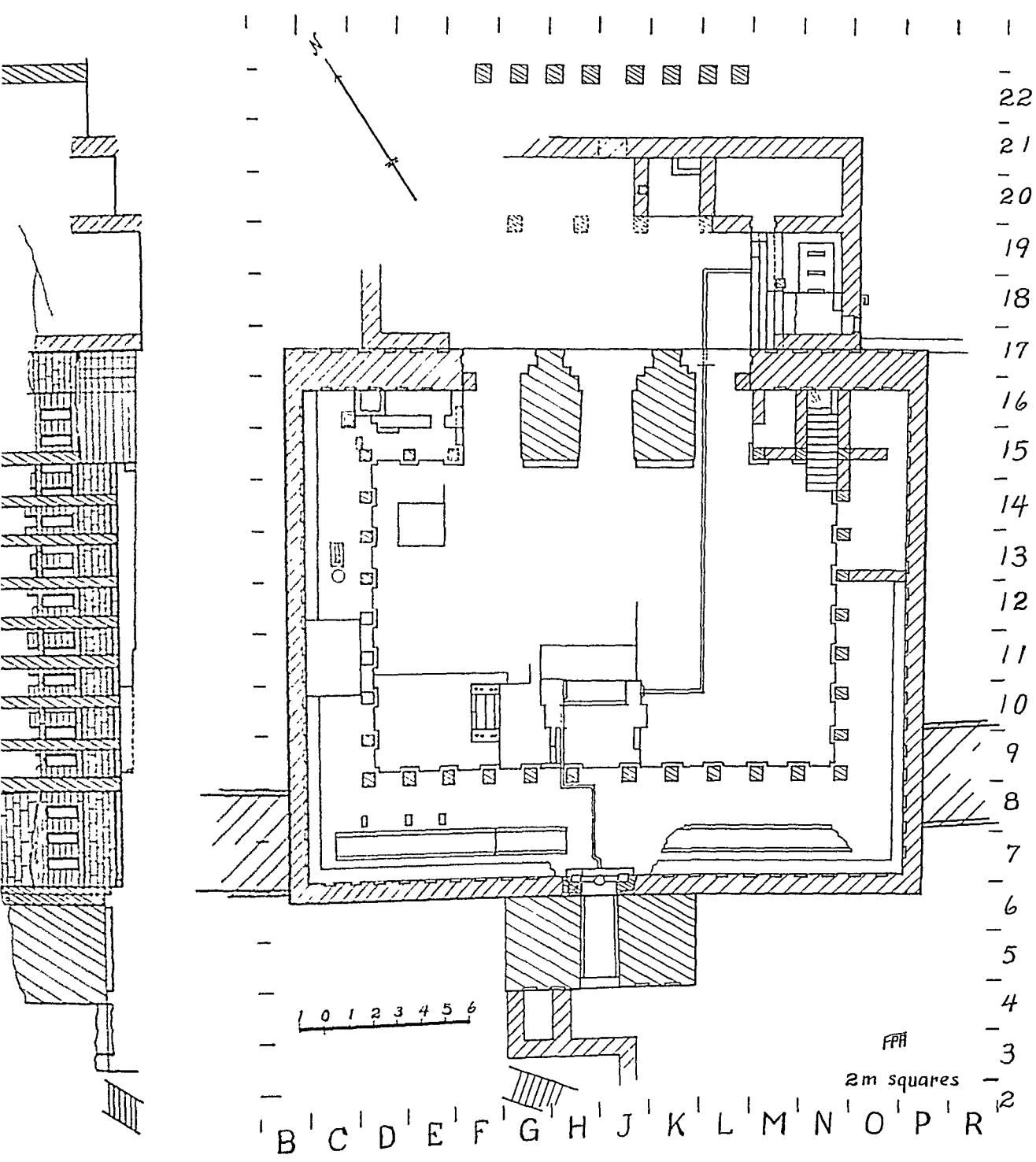
159. The west doorway of the temple.



160. West side of the oval wall at the doorway; the cutting for the attached bronze (?) animal is seen to the right of the door.



161. Excavating inside the oval wall, from the south.



162. Plan and elevation of the entrance hall.



163. Excavating the south row of piers in the entrance hall. Mârib is in the distance at the right.



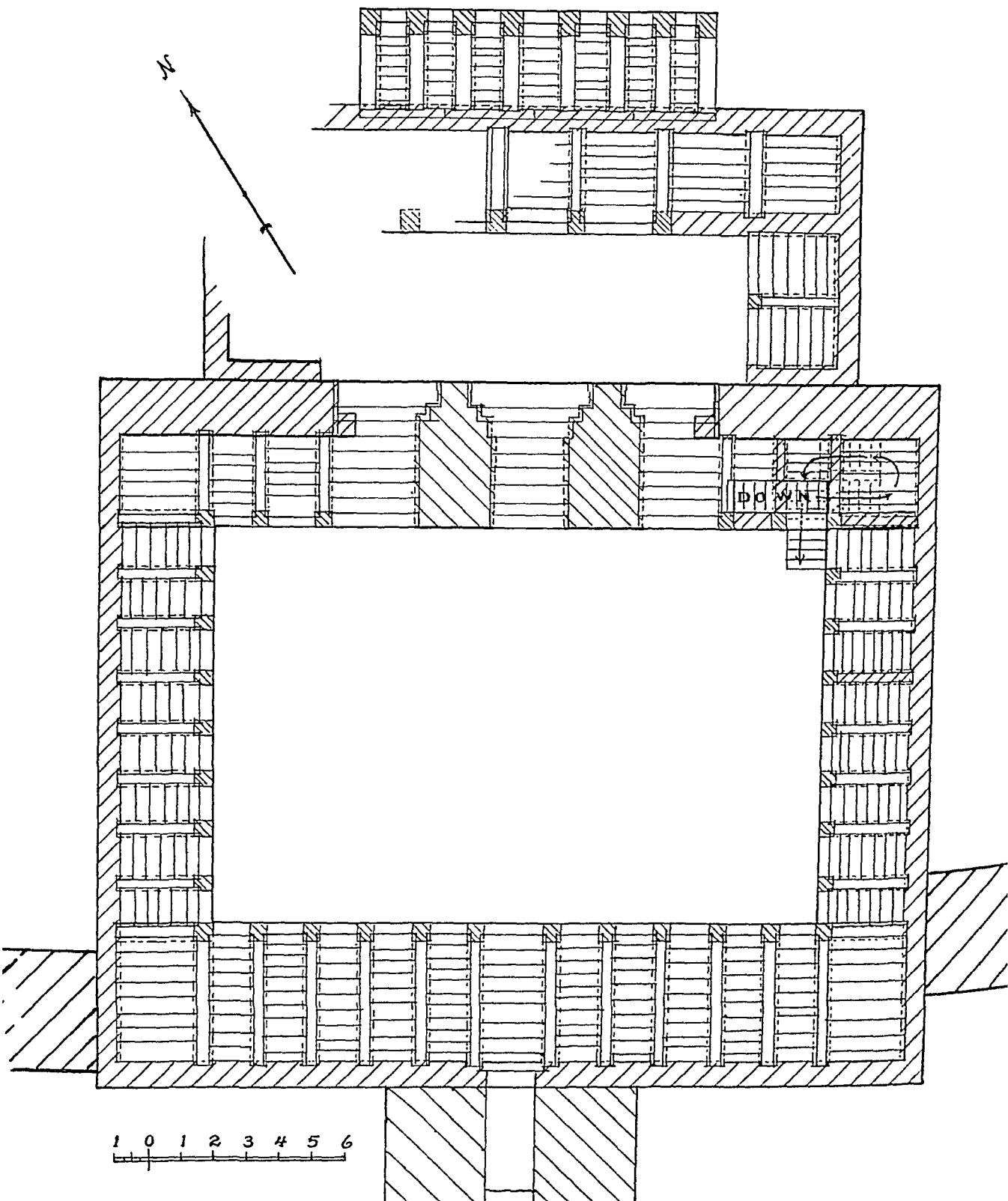
164. Excavating the south row of piers in the entrance hall, from the northwest.



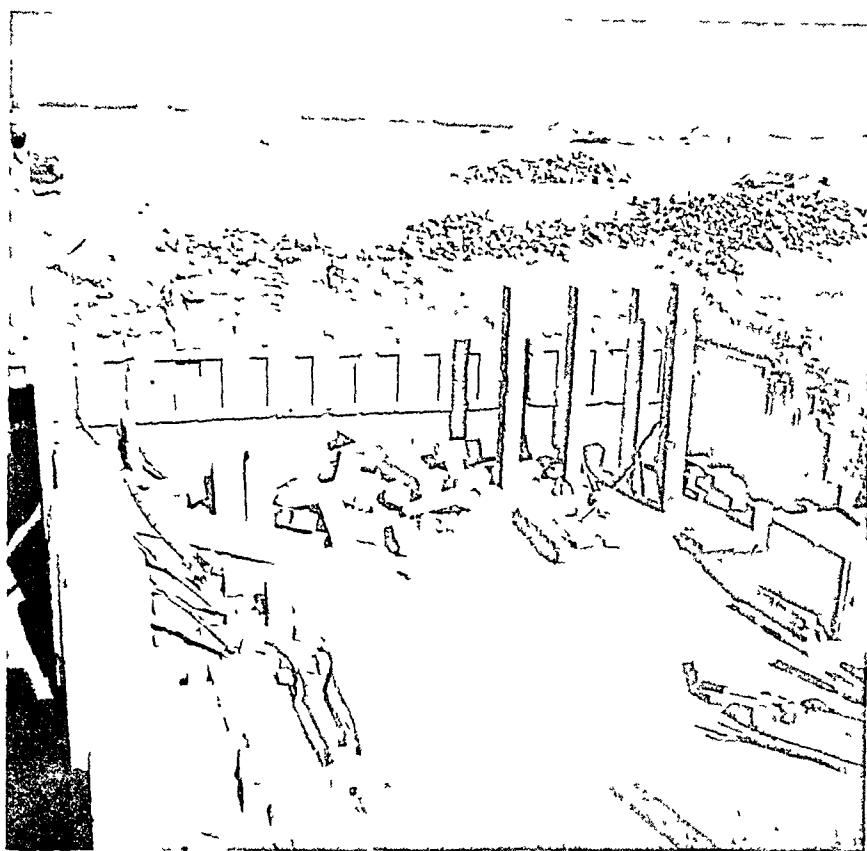
165. "Windows" in the southwest corner of the entrance hall.



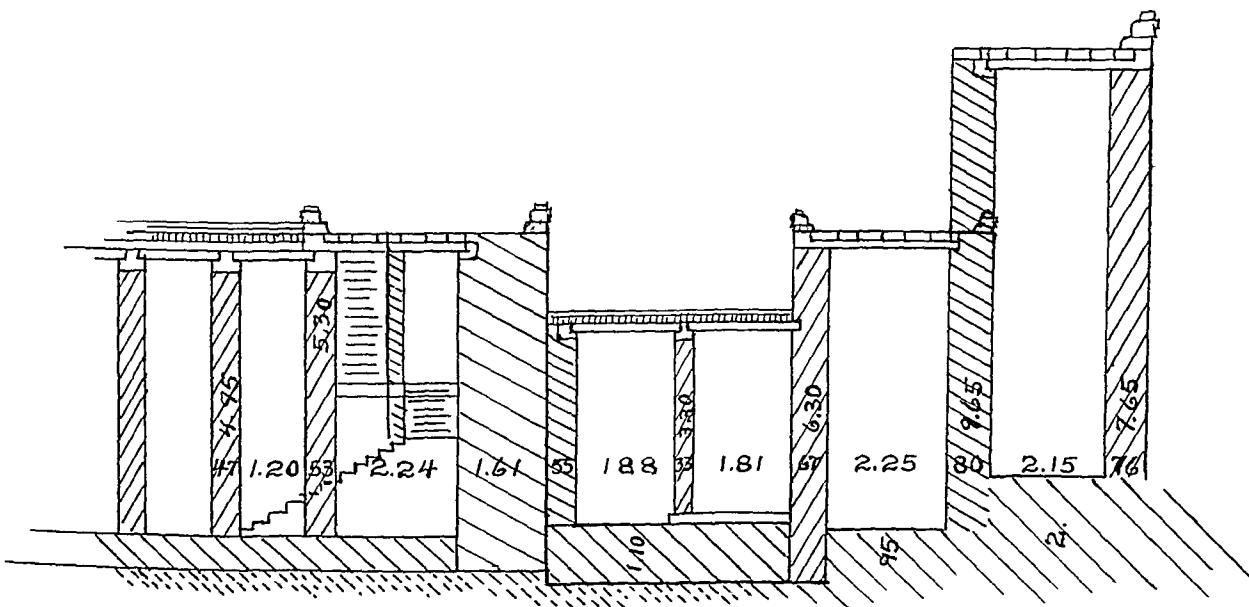
166. South portico of the entrance hall, cleared.



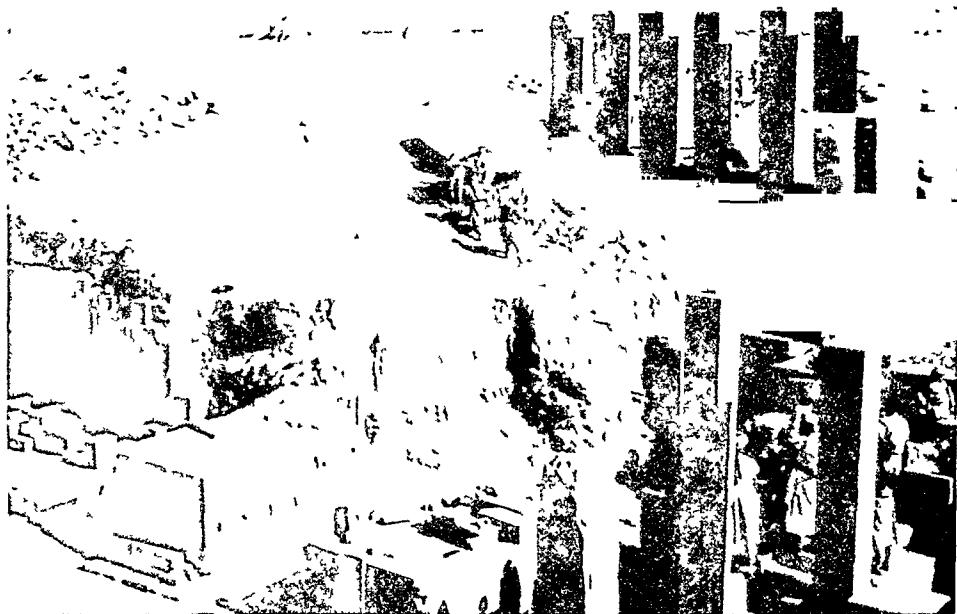
167. Reconstruction of the roof of the entrance hall.



168. Northwest corner of entrance hall.



169. Reconstructed elevation of the structures adjoining the entrance hall on the north.



170. Pylons of the triple door, from the southeast.



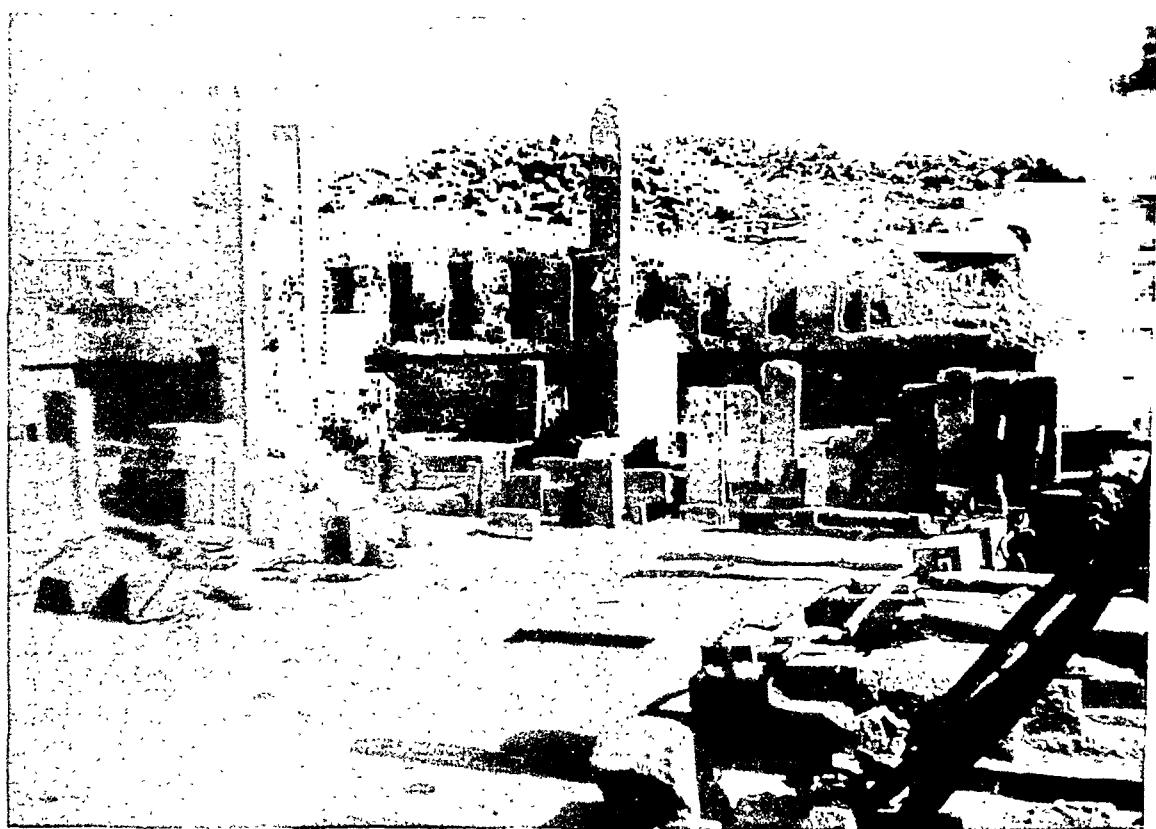
171. Central door between the pylons.



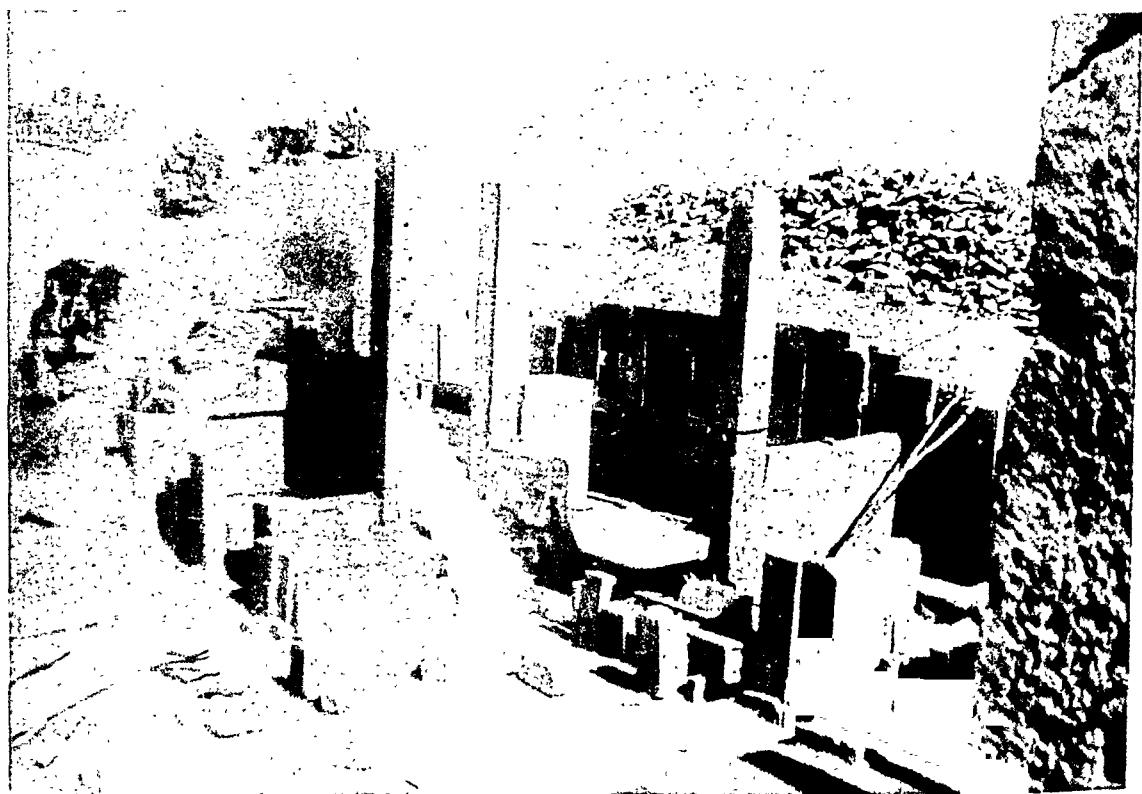
172. The temple doorway from the court of the entrance hall.



173: Hole eroded in steps of temple doorway.



174. East side of the entrance hall, with row of inscribed stones.

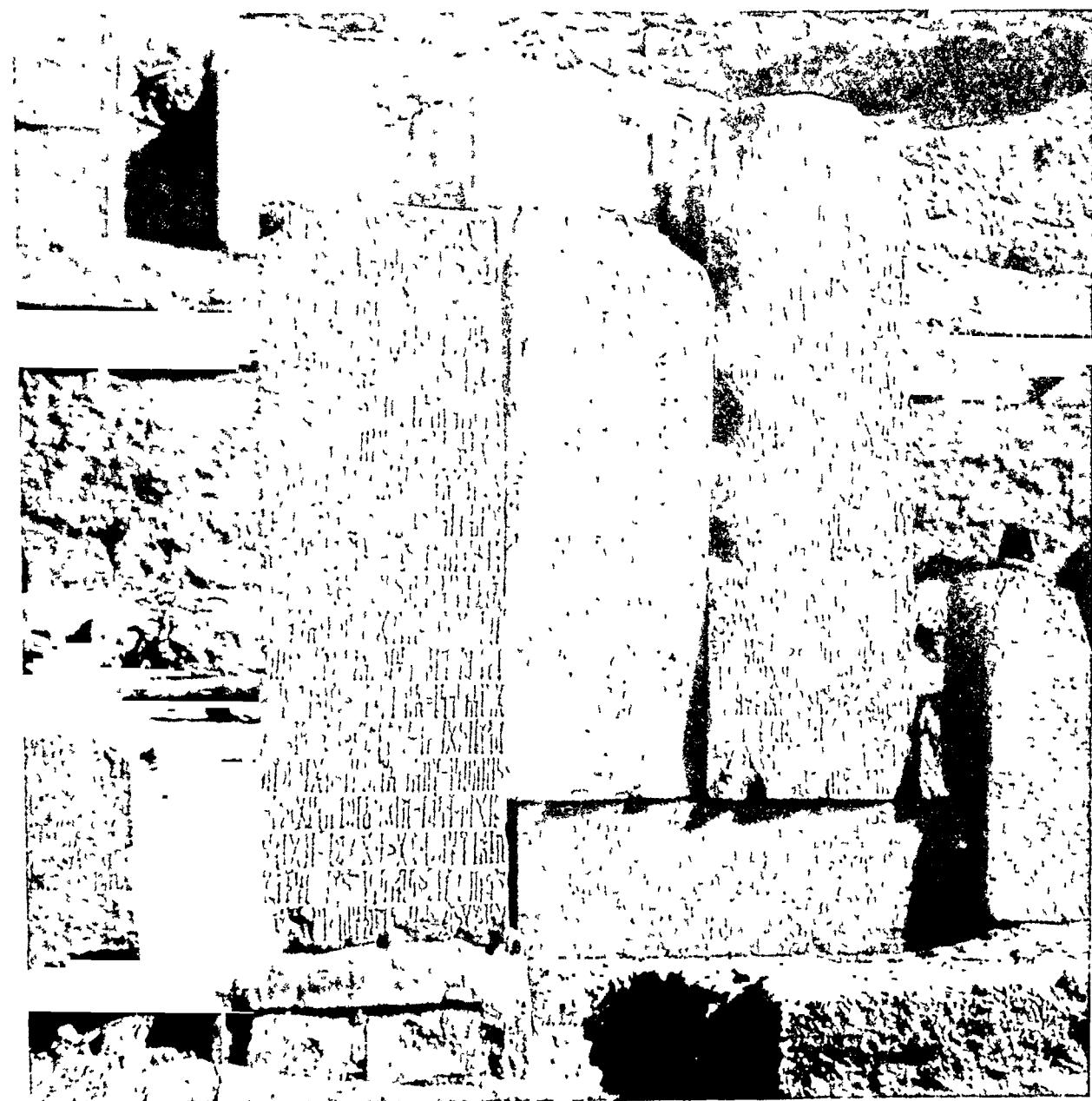


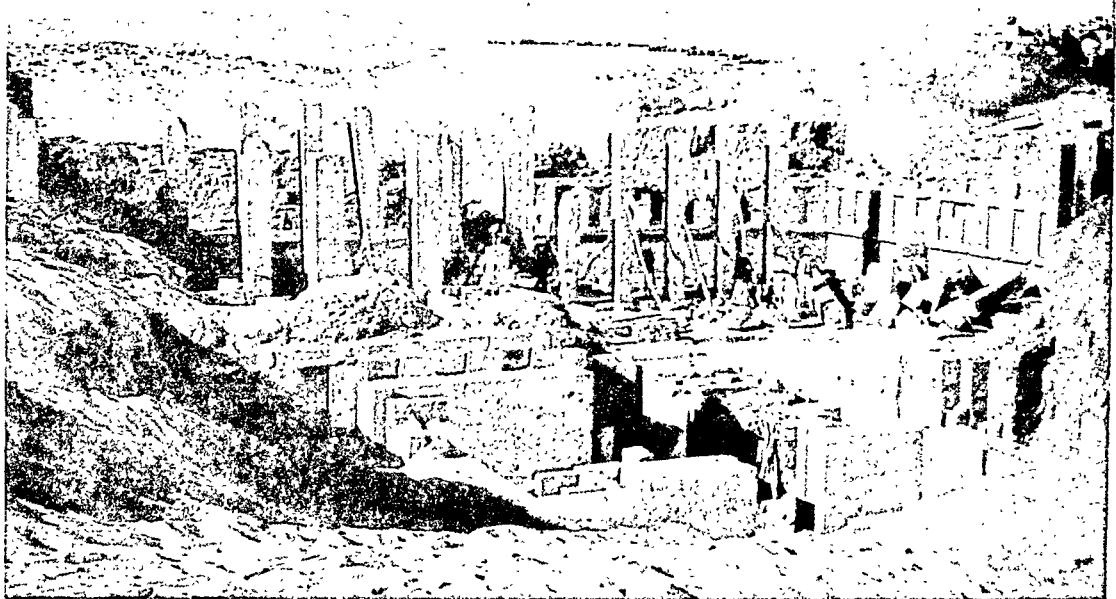
175. Stairway and rooms in the northeast corner of the entrance hall.



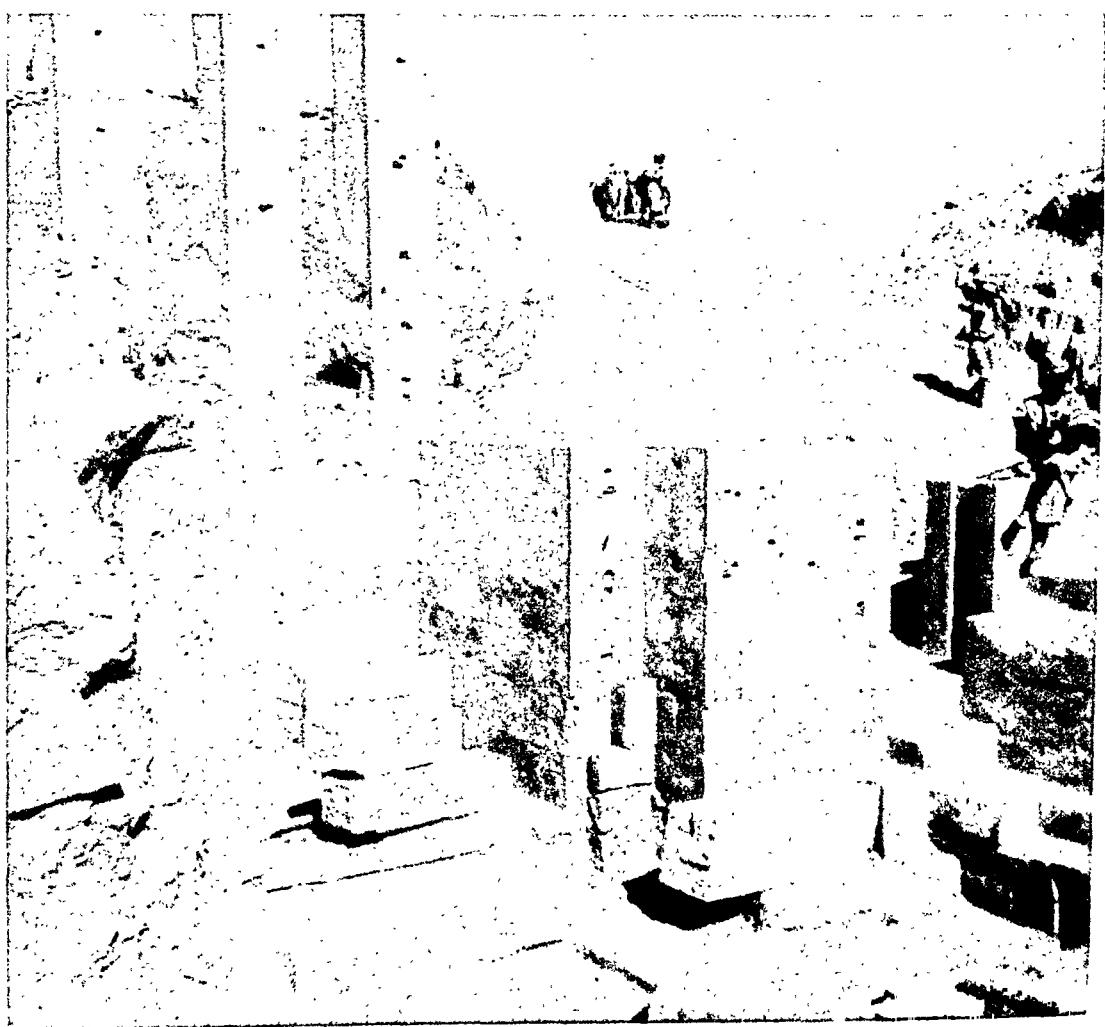
176. Constructions in the northwest corner of the peristyle.

177. Inscribed stones in the entrance hall.





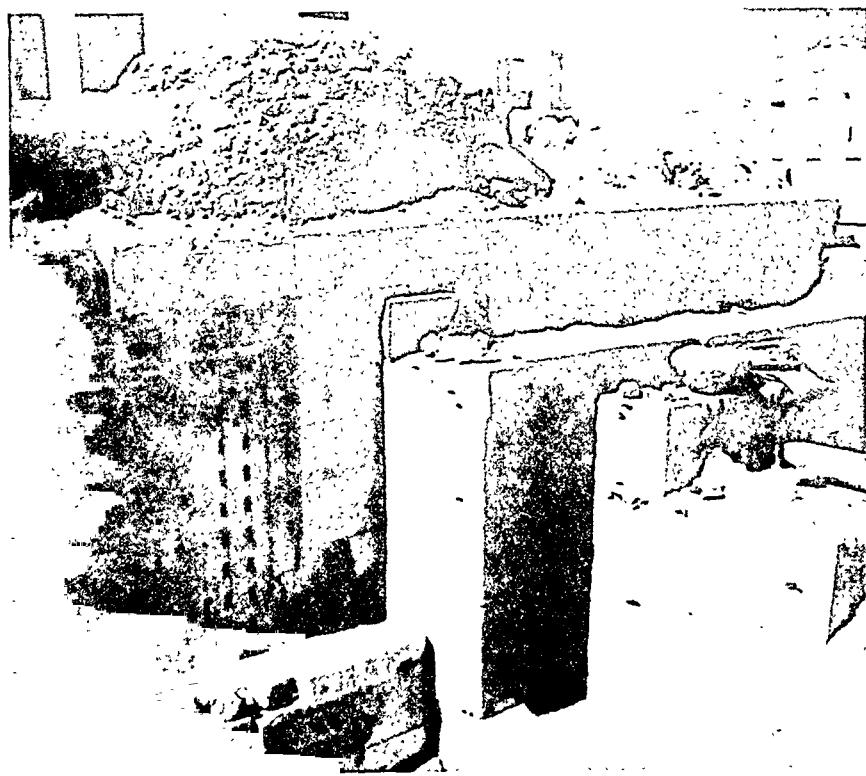
178. Entrance hall and outer structures, from the northeast.



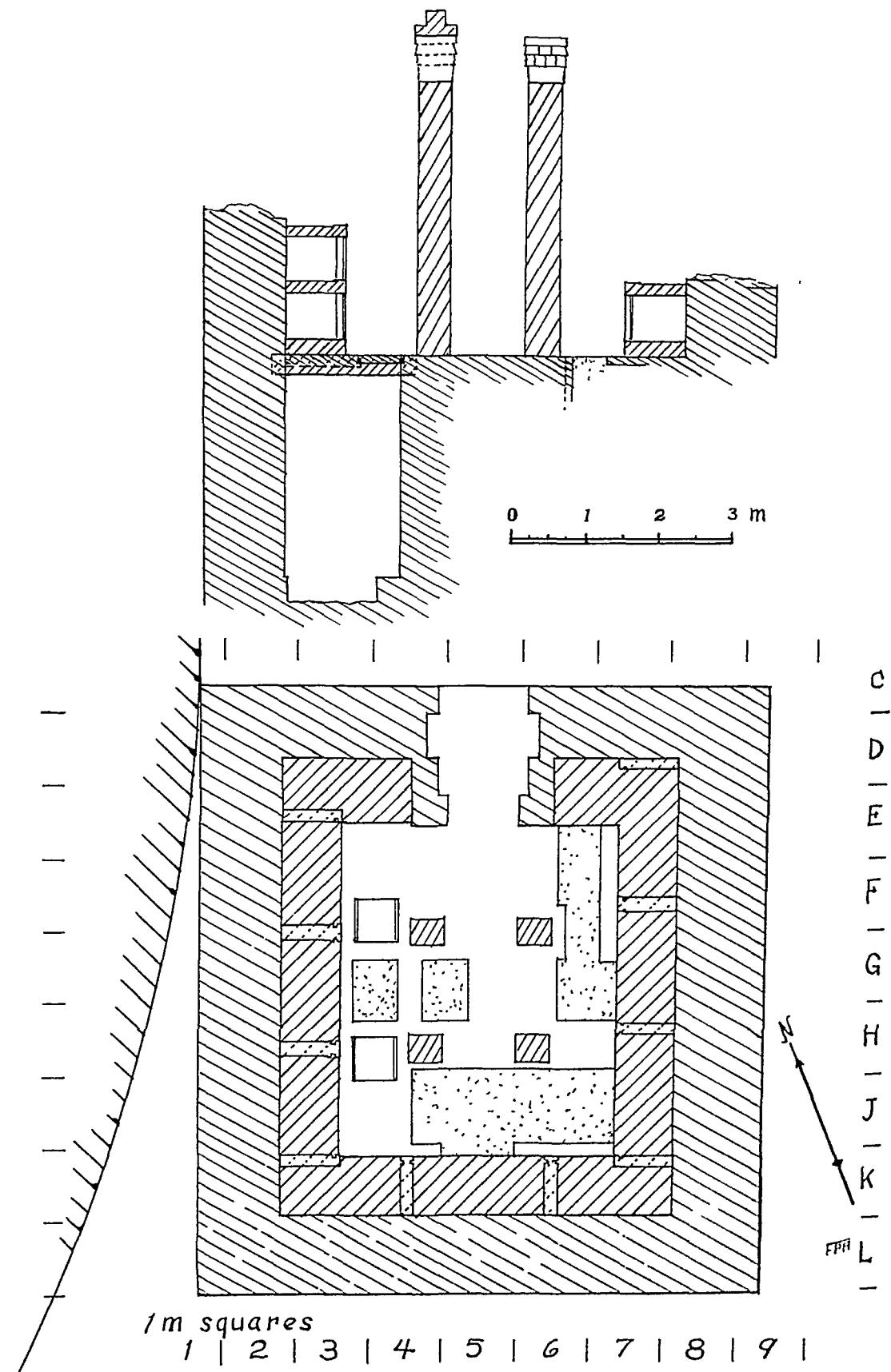
179. Northeast corner of outer court, with stairs.



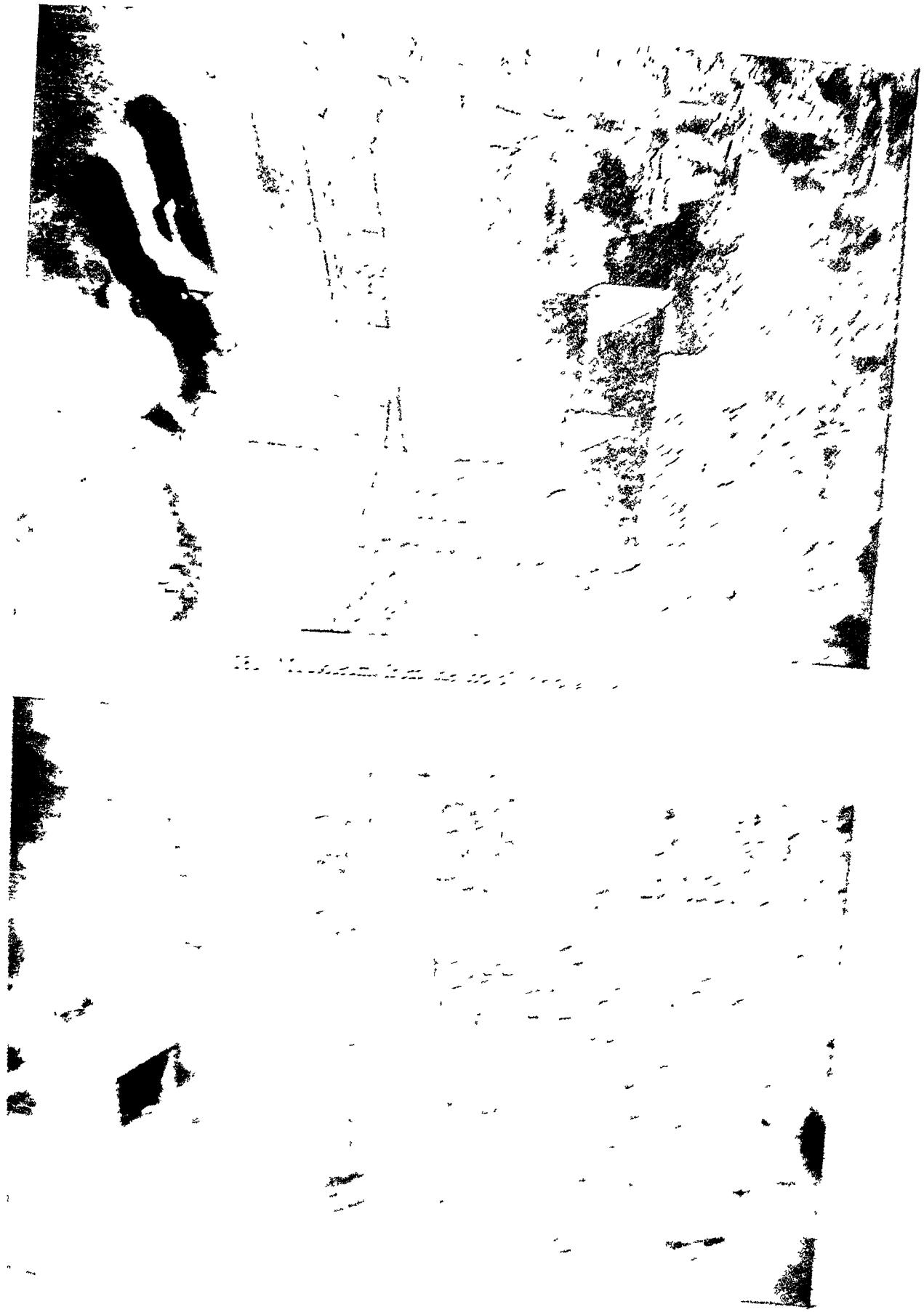
180. Inscriptions on the wall of the table platform.

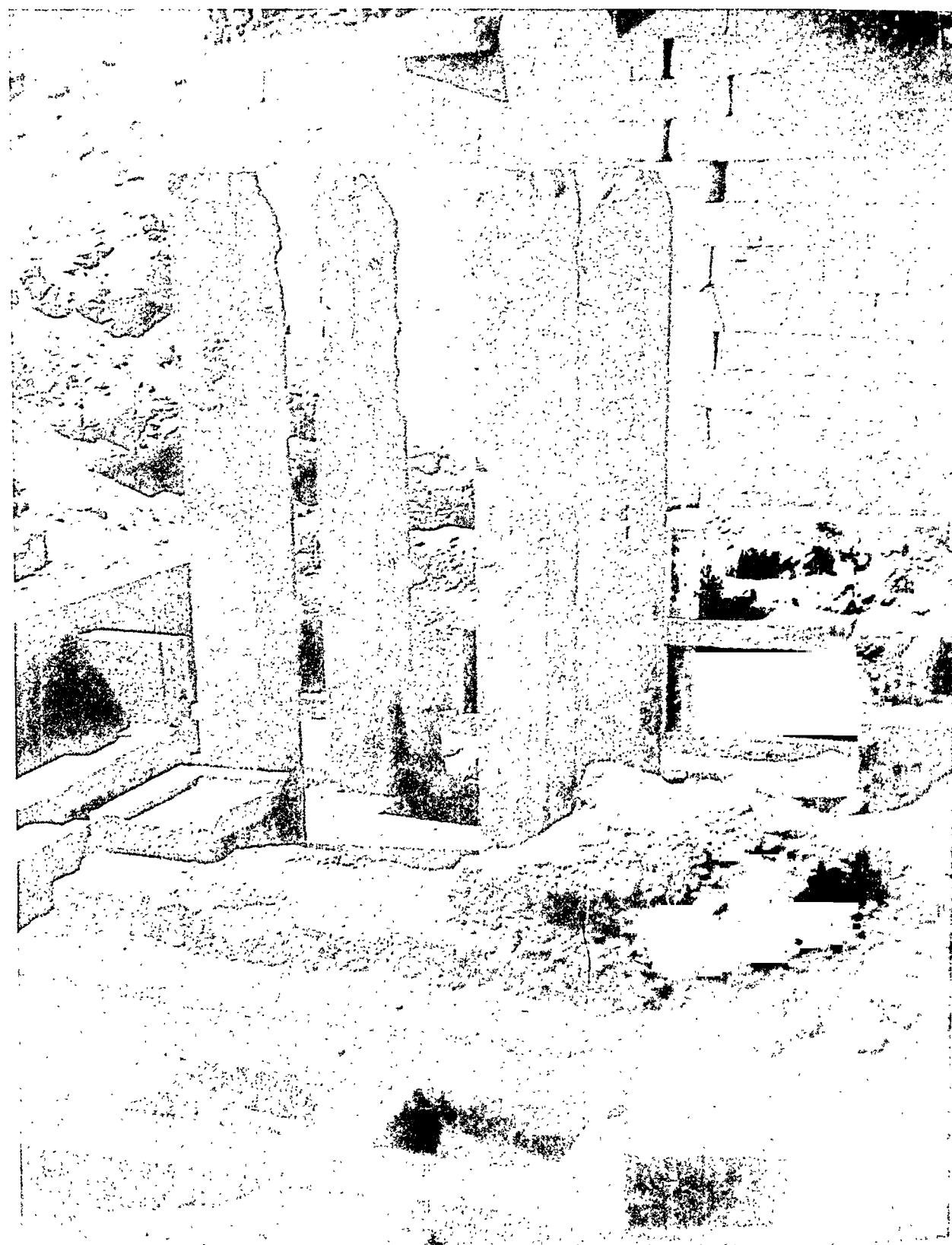


181. East doorway and outer bench.

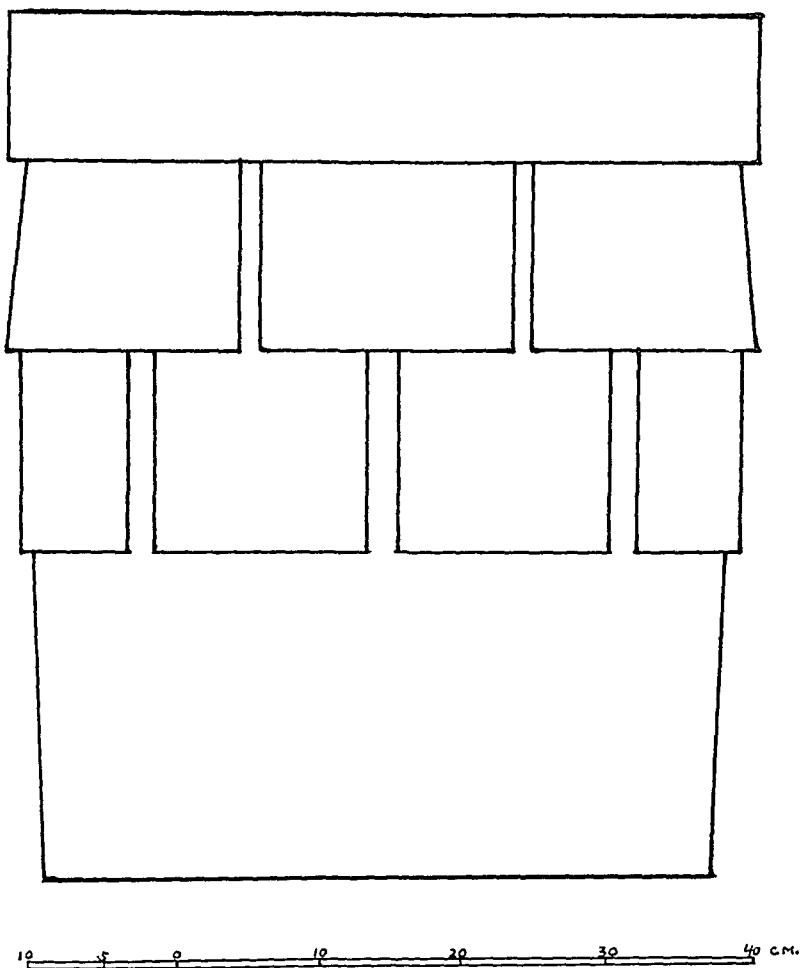


182. Plan and elevation of the mausoleum.





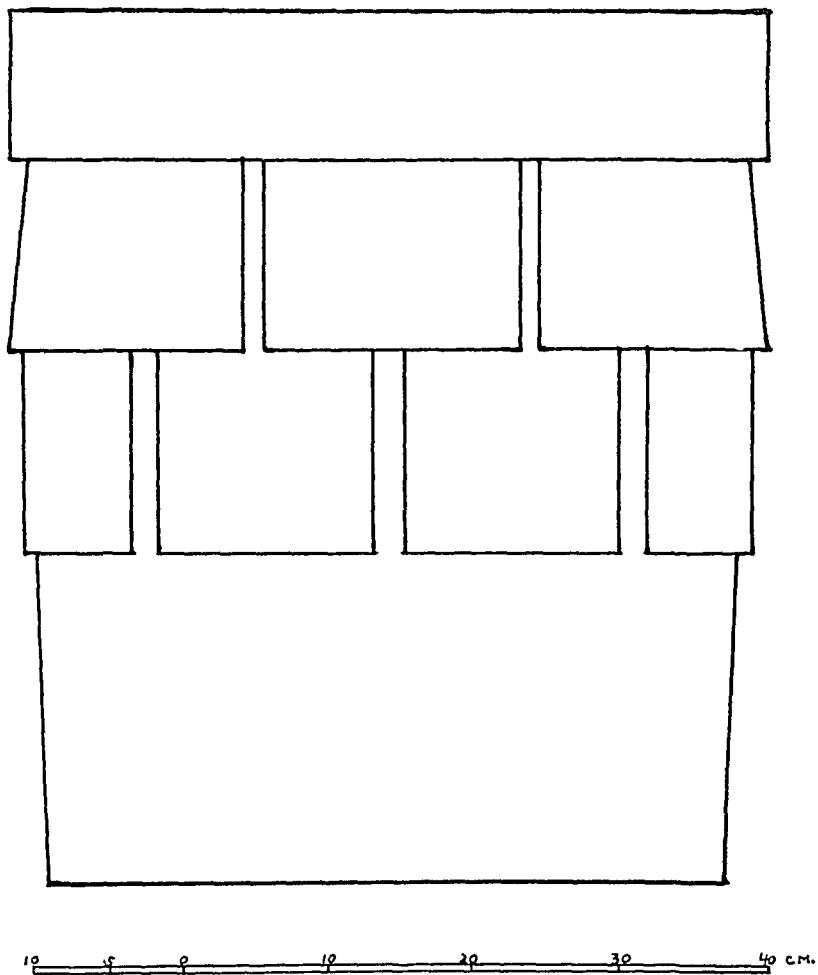
185. Mausoleum, from the east.



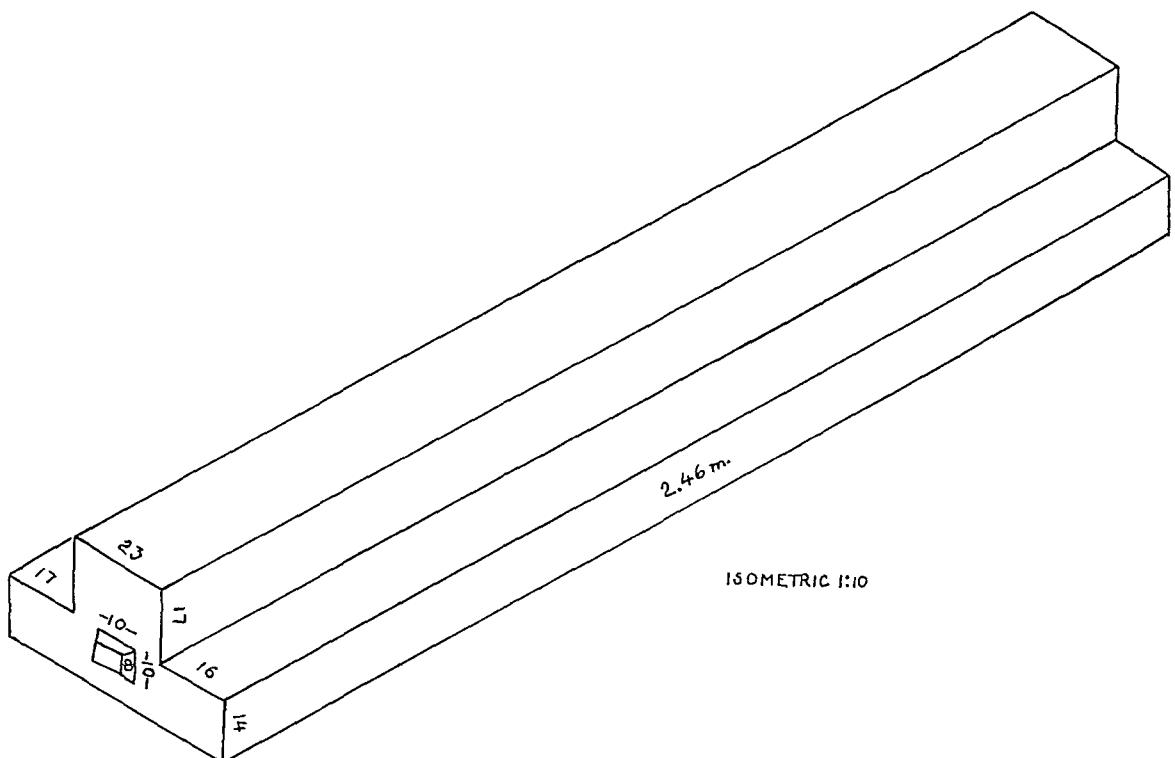
186. Capital from the mausoleum.



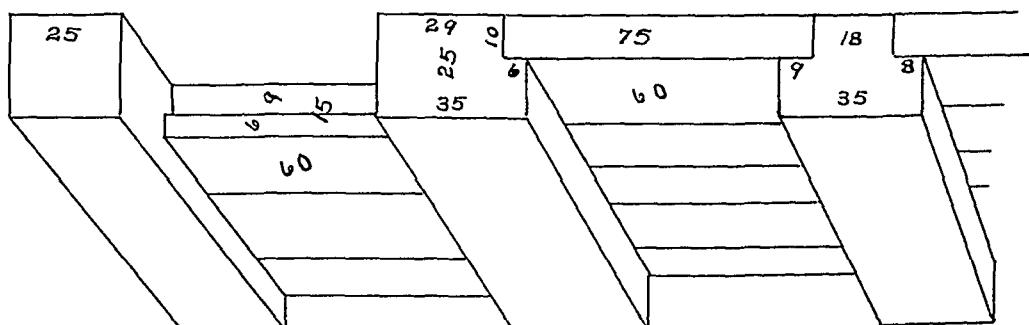
185. Mausoleum, from the east.



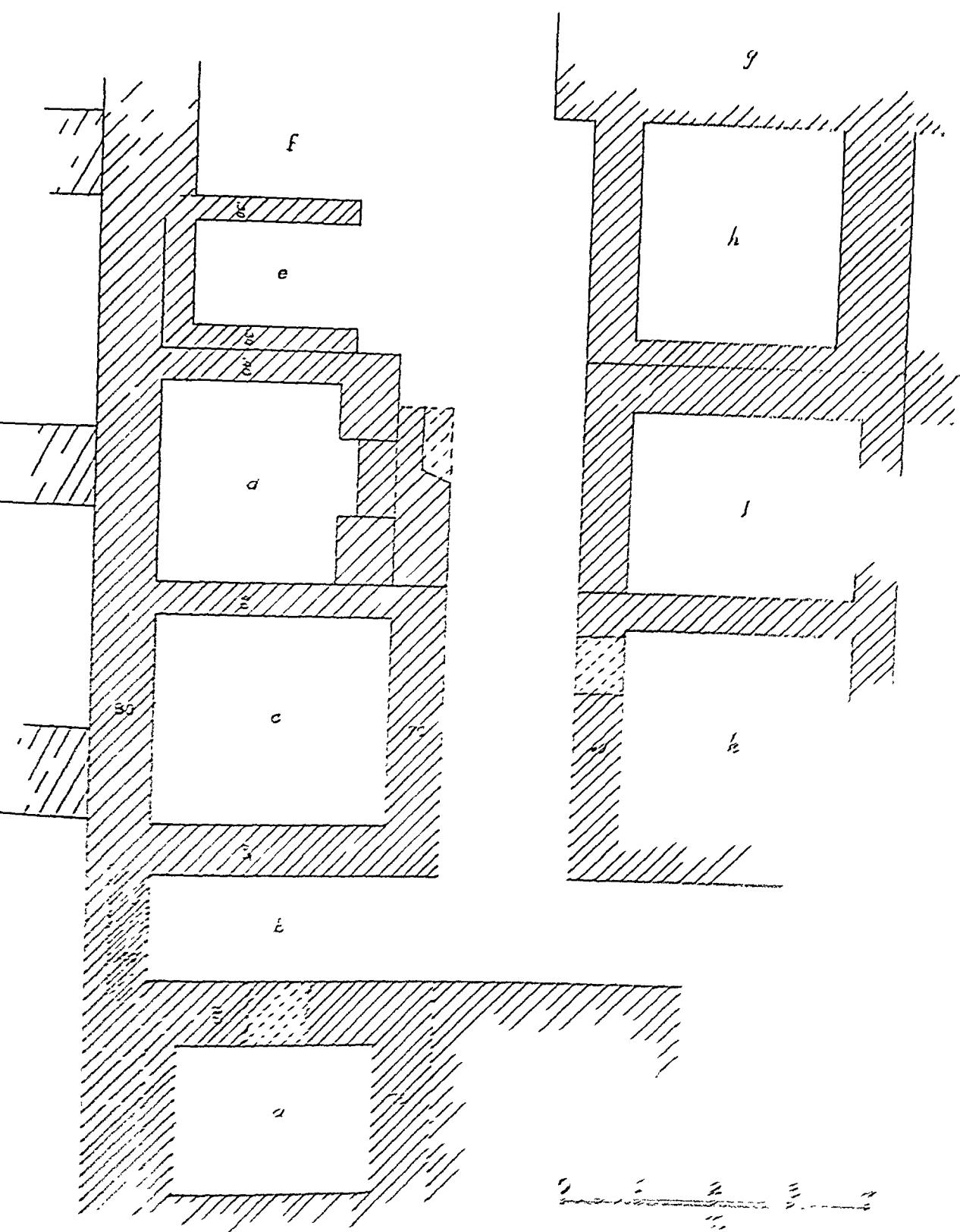
186. Capital from the mausoleum.



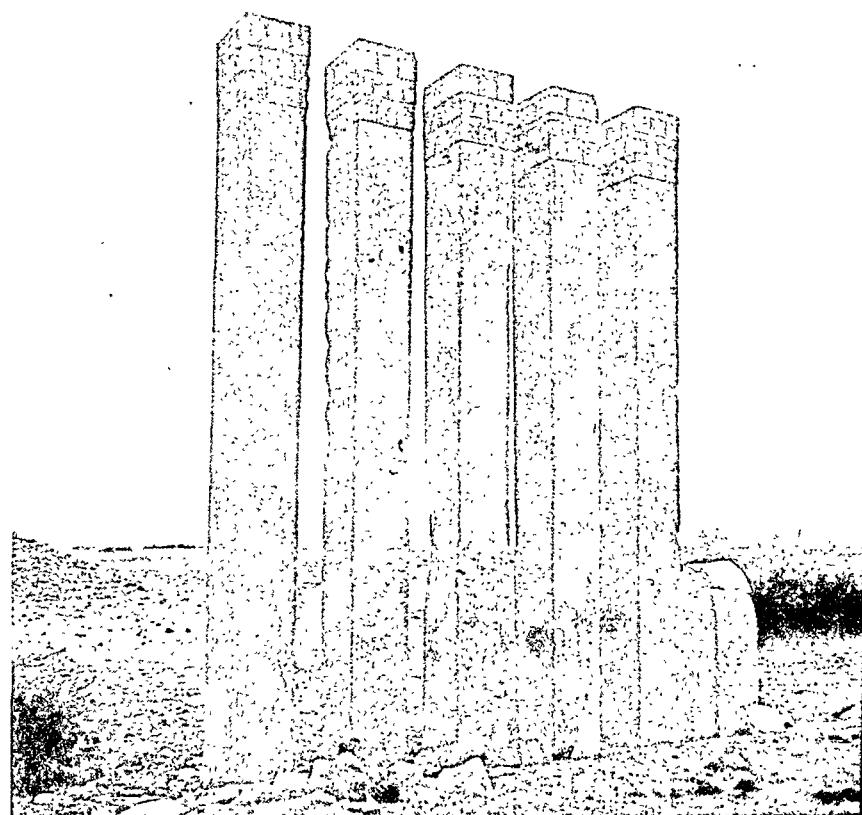
187. Ceiling joist from the mausoleum.



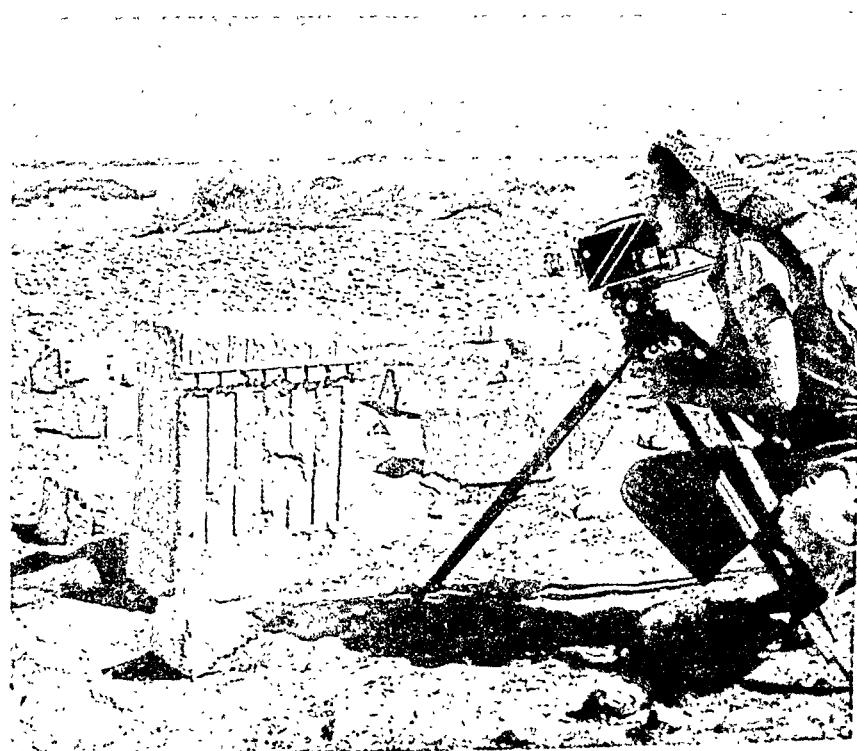
188. Construction of the mausoleum floor, from below.



Excavations at Mârib in Yemen



190. Piers of Bar'ân.



191. Base or altar at Bar'ân.

Catalogue of Objects

FOUND IN MÂRIB EXCAVATIONS

Frank P. Albright

The objects are located according to the grid system which was laid out in 2-meter squares (Plate 162). The depths at which the objects were found are given in meters above the floor. "Surface" finds include those objects brought in by natives; most of them come from the vicinity of 'Awwâm or from the ruins of Mârîb. The author has attempted to supplement the photographs by outline sketches made from descriptions and quick sketches in his field book, particularly in pottery forms. These sketches, however, were intended merely for identification and are not scientifically accurate; therefore they are to be considered only as approximations.

1. Square C 11, 5 m. above the floor. Limestone wall panels, 27 cm. wide, 43 cm. high, 6 to 7 cm. thick, in imitation of stone masonry. Plate 192: 1.

2. C 11, 2 m. Decorative panel in the form of alternating plain and dentil bands. Plate 192: 2.

3. P 8, 3.50 m. Limestone block, 30 cm. long, 25 cm. high, 20 cm. thick, with part of a frieze of rams' heads. Three are preserved.

4. Surface, northwest of temple. Fragment of limestone block with ram face. Similar to no. 3.

5. L 9, 1 m. Stone fragment, 21 cm. long, 23 cm. high, 8 cm. thick, with frieze in 4-mm.-high relief of conventionalized bucephala surmounted by flowers. Plate 192: 5.

6. J 8, *in situ* on floor against south side of pier J 9. Alabaster base for bronze monument. It is 22 cm. high with an additional rough projection of 14 cm. which was covered by the monument. Base is 43 cm. wide, 27 cm. deep at the bottom, diminishing in 5 receding stages to a flange 3 cm. wide and 35 by 22 cm., on top of which the monument had been set in cement. Marks on the pier indicate that the monument was rectangular at the back, 1.08 m. tall and 25 cm. wide. Plate 192: 6.

7. J 7, 1.70 m. Alabaster monument base similar to no. 6. 27 cm. high. Bottom, 43 cm. wide, 32 cm. deep. Top, 29 cm. wide and 20.5 cm. deep with a rear plaque 21 cm. wide. The base consists of five steps, each set back

c. 3 cm. The top step, forming the base for the hollow monument, is 35.2 cm. wide and 25.7 cm. deep at a height of 23 cm. above the floor. The front has an additional setback which is painted red.

8. M 8, *in situ* on the floor against the south side of pier M 9. Alabaster monument base. 39 cm. wide, 36 cm. deep, 6 cm. high. Except for a narrow band along the front and sides, the top is rough-cut as if it were to be covered by the monument. The corners and front edge show much wear from being used as a step.

9. G 7, near floor level. Limestone anta capital. 36 cm. high. Top, 38 cm. wide. Bottom, 31 cm. square. Three bands, 8, 3, 3 cm. wide, alternating with three rows of raised tegular panels 8, 7, 7 cm. wide. Small hole in bottom. Plate 192: 9.

10. Mausoleum G 7, 1.30 m. Granite capital. Top, 42 by 51 cm. Bottom, 37.5 by 46 cm. Height, 60 cm. From top to bottom it is decorated as follows: A vertical band; a band of raised tegular panels, 3 to a side, projecting outward at the bottom; a band of vertical raised tegular panels, 4 to a side; a wide band tapering in at the bottom. Plate 186.

11. D 10-11, 1 m. Bronze statue of a man (Plates 196-198). 93 cm. high. Width across shoulders, 27 cm. Length of right forearm, 19.5 cm. Length of left forearm, 18 cm. Length of feet, 15 cm. Height of head, 15 cm. He stands in walking attitude, left foot advanced, wearing a short skirt and lion-skin cape. His skirt, a rectangular piece of cloth, is wrapped snugly around his thighs, with the right end overlapping the left. The open end of the skirt, being pulled tightly around the waist, creates an interesting curved line from above the left hip down to the center front. The difference in circumference at the top and the bottom of the skirt causes the left end to hang slightly lower, breaking the otherwise straight line of the bottom of the skirt. A broad belt hides the top of the skirt. It is even in width, without knot or buckle. Two narrow ends hang down at the back, which are probably intended to represent either loose ends or tassels. Stuck into the belt, a little to the right and pointing down toward the center, is a sheathed dagger. The scabbard is straight with a slightly bulging round end. The handle of the dagger is thick at hilt and butt and is studded with 4 large rivet heads.

Over the man's back a lion skin is draped; its forepaws cross in front of his chest and its hindpaws grip his thighs.

No clasp or other means of holding the paws in place is indicated. The lion's head hugs the back of the man's neck and its tail hangs to the edge of his skirt. The head of the lion is small and almost unrecognizable and the paws look like human hands. Apparently the lion skin was extremely thin, for the shape of the man's shoulder blades is distinctly visible through it.

His hair is indicated by concentric rows of knobs converging at the crown of the head (see E. Gjerstad, *The Swedish Cyprus Expedition, III Plates*, Stockholm, 1937, Pl. 17: 1-2). As shown at the edge, it is 3 layers in thickness. A double band of ribbons, tied on the left side just above the ear, encircles his head. At one point on the right side the ribbons project abruptly, leaving a small hole for the insertion of some ornament. At the present time, the Bedouins of South Arabia still tie their hair with a ribbon.

His arms extend before him; the right is raised more than the left. In the right hand he probably held a staff which had been inserted through the hole in his fist. With his closed left hand and between his second and third finger, he holds a round seal, 2.5 cm. in diameter, with a design which now appears only as an oval boss. Just above the elbow of his left arm is a narrow ribbon with a single tie on the outside.

The torso is modeled in broad, flat planes. Two small folds of flesh at the base of the neck probably represent the collar bones. The legs are straight, with a sharp ridge running down the front and a curved incised line from the ankles to the knees outlining the muscles of the calves. Another sharp ridge runs up the front of the neck, which is slightly conical, tapering upward to the broad, stiff head. The eyes are large and conventionalized; the irises are indicated by incised circles in the center of the eyeballs. The eyebrows are sharp ridges above the eye sockets and follow the curve of the upper eyelids. The nose is large, slightly arched in profile, and the nostrils are deeply indented. The mouth is a rather short, narrow slit, and a lightly incised line runs down each side of it from the nose to the chin. A beard of tight curls, indicated by rows of knobs, extends from the temples to below the chin. He has no mustache. The ears are large and simply modeled, with large bulbous lobes.

The front of the statue is covered with a lightly engraved boustrophedon inscription running from the shoulders to the bottom of the skirt and continuing on the right knee. Jamme has succeeded in deciphering part of it as follows:

'mdkr/bn/lh ←	'Ammidahar, son of Lahā-
y'tt/bn/kr(?)→	y'atāt, of [the family of] Kar(?)
t/hqny/'l ←	at, has dedicated to 'Il-
[mq]h/slmn/dhb →	[umq]uh this statue in gold
n/ ←

The name Ma'adkarib at the beginning of the inscription on the left shoulder appears to be the name of the statue of the man represented.

When the statue was found both arms and the right foot were broken off. The left foot was bent up sharply and nearly broken off. The writer repaired these breaks with iron rods (the only available metal) and cement, and painted the exposed cement with a paint made from the green copper oxide brushed from the statue.

The bronze is cast over a core of black carbon-like substance into a shell about 2 to 3 cm. thick. It is fairly uniform in thickness except that the inner surface does not follow the small contour irregularities of the outer surface as far as could be determined. No indication of seams, vents, or pour holes of the mold was detected.

The outer surface of the bronze is rough and granular, heavily coated with powdery copper oxide, light green in color.

There is an apparent contradiction between the statue itself and its inscribed text. The statue is bronze, but the inscription states that it is "gold" (*dhb*). The incongruity cannot be resolved by holding that the South Arabians used *dhb* for bronze, since we know of no instances in the Semitic dialects where the metals or their respective names are confused. The probable solution is that the bronze statue was originally gilded with gold leaf which was later scraped off. The scraping marks, if there were any, have disappeared with the subsequent oxidation of the bronze surface.

The statue is aesthetically very good, but highly stylized. Realism was sacrificed for aesthetic formality. It is by no means primitive, but shows a long development of aesthetic study, which is difficult to trace with our available material. W. F. Albright has traced the lion-skin motif to the favissa of Marathus in Phoenicia where such statues represent Baal Melcarth (W. F. Albright, "Notes on the Temple 'Awwām and the Archaic Bronze Statue," *Bulletin of the American Schools of Oriental Research*, no. 128, 1952, pp. 38 f.). This motif came from Phoenicia at an early date, and represented the youthful Baal Melcarth, or his Greek counterpart Heracles. Its date about the sixth century and presence in the temple of the moon-god 'Illumquh is difficult to explain. If the statue could be cleaned and the whole inscription read, perhaps the relationship between the lion-skin-clad figure, the name Ma'adkarib, and the moon-god, lord of 'Awwām, would be revealed.

12. L 13, 60 cm. Bronze statue of a young man (Plates 199, 200). Height, 43 cm. with most of the legs below the knees missing. The head was broken off low into the chest. A large crack extended down the back of the right shoulder to the hip, and another down the front from below the right arm. There is a third crack below the left arm extending to the hip. The right shoulder was twisted forward and outward. The edges of the breaks were considerably bent and a few pieces of the back were missing. A large piece was broken out of the top and back of the head and was found several meters from the statue. It had already been broken in antiquity and a new piece had been made, with the hair more crudely rendered than on the original. It was secured to the head by means of four bronze rivets which project crudely on the surface. A bronze plate, slightly larger than the hole at several points, was riveted to the new piece. After it was inserted into the hole, the cavity was filled through gaps around the poorly fitted patch with some substance to hold the plate against the edges of the break. The writer repaired these breaks again. The left knee had been broken and brazed. It is now broken below the upper edge of the ancient repair. The right arm had also been broken and fusion-welded by pouring molten bronze into a mold placed around the break; the repair resembled an arm band with floral design. A strut above the hip braces the left arm.

The man wears only a knee-length skirt with the opening at the front, the right side overlapping the left. It is difficult to tell whether the ropelike roll at the waist is a belt or the roll of the skirt (present-day Arabs keep the skirt in place by rolling the top edge). The skirt is also edged with a rope design. It is drawn up in front creating four folds which radiate downward and around the back. The man has a straight dagger, 5.8 cm. long, tucked behind the belt roll, with the handle slightly to the

left. Around his neck he wears a braided necklace with a pendant, 2.1 cm. long, decorated with crosshatching.

His head is covered with rows of protruding knobs representing the hair. Around the forehead a smooth band projects slightly below the knobs. Originally the curly hair was probably represented by knobs, but through the course of time the curls became so conventionalized that the artist no longer knew what the knobs represented. He copied them simply as an artistic convention. Statue no. 13 has distinct strands of hair projecting at the temples from beneath the knobs.

The small ears project in front of the hair. The eyes are large, pointed ovals set between thin eyelids. The nose is large, straight, and rather well modeled; the mouth straight, small, thick-lipped, and sober; the chin well modeled; and the neck very thick. The face is smooth-shaven.

The arms project forward from the elbows. The right hand is open and raised, as in gesture. The left is closed with a rectangular hole through the fist where it once grasped an object, probably a staff.

The thin, straight-hipped body is much too small for the head and shoulders. The arms and hands are also slightly small. The modeling of details, except for the eyes, is more realistic than in most of our statues and statuettes. The round features possibly suggest an attempt at portraiture.

On his chest is a ten-line boustrophedon inscription:

<i>yf'mr/wmyt'/nlynhn/</i>	Yat'a'amar and Mu'yattî, the
<i>bny/3r'lmw/yhqny/lm</i>	two Natalites,
<i>qh/b'l/wm/mflnhn/</i>	of (the family of) Sarâ'hunu,
<i>dhbñ/wbnyhmw/zj</i>	have dedicated to 'Illum-
<i>d'l/wkrb'tt/bdt</i>	quh, Master of 'Awwâm, these
<i>hwfjhmy/lmgh</i>	two statues
<i>dt/tnb'hw/</i>	in gold, and their two sons, Zay-
<i>wyhw/synh</i>	d'il and Karib'aqt, because
<i>mw/b'tr/</i>	'Illumquh has granted them both
<i>wlmgh</i>	[the sons]
	as He [Illumquh] had prom-
	ised to him [Yat'a'amar]
	and [because] He will grant
	them. By 'Attar
	and 'Illumquh.

13. D-E 13, 35 cm. Bronze statue of a man (Plates 201-203). Height, c. 50 cm. When found the legs were intact to the ankles and the total height was 67 cm. But the bronze of the legs was entirely oxidized to a powder and some small fragments. The black core was soft, so that the legs could not be saved. Perhaps the small pile of lime plaster in contact with the legs caused this rapid deterioration. The head was broken off, but lying near by. The right arm was found a meter away. The body is considerably cracked from the swelling of the core.

The body and head were cast separately and brazed together. It is certain that they were not made by the same man, since there is a great difference in workmanship. Probably the head is from another statue. But it is possible that the head is the work of the master and the body the product of his pupil or more likely his slave since it is doubtful if a master would accept such crude work from a student for such a fine head.

The man stands stiffly with his feet close together, his arms bent at the elbows. The right hand is open and straight while the left is closed, clutching a round staff for which the hole remains. The head is erect and turned slightly to the right. He wears a skirt reaching to the knees, with the right side overlapping the left in front of the left thigh. Where the corner of the right overlap hangs down slightly in the Ma'adkarib statue (no. 11), it

has here degenerated into a meaningless rectangular projection. He wears a belt 25 cm. wide with rolled top and bottom edges, but no tie or buckle.

The head is in excellent condition. It has a beautiful green patina, whereas the body has a rough, grainy texture and a powdery verdigris. The expression is sober and intelligent. The head, 9 cm. from chin to top, sits on a very long, tapering neck. It is covered with the usual knobs, closely packed and neatly made. The large but well modeled ears protrude on the outside of the hair. The beard, down the sides and below the chin, is outlined by an incised line and indicated by rows of triangular holes. Strands of hair protruding below the knobs at the temples, the eyebrows, the mustache and a tuft of hair below the lower lip are incised. The eyes are large. The upper lid, heavier and more arched than the lower, has the appearance of overlapping the lower at the corners without actually doing so. The irises are indicated by lightly incised circles. The ample, straight nose with its high bridge is nearly in line with the forehead. The mouth is well proportioned and very well modeled.

14. J 13, 80 cm. Right arm of bronze statue. Length, 29 cm., broken off near the shoulder. Near the break is an ancient fusion-weld which had been made to appear as an arm band. The arm is bent 45° at the elbow. The hand is open with the fingers spread and slightly flexed as if in gesture. Plate 204.

15. J 11, 30 cm. Right arm of bronze statue. Length, 21 cm. Length of hand, 10 cm. Similar to last except that it is slightly smaller and the hand is bent back more at the wrist. The fusion-weld on the arm is more neat. The lower edge of the weld is straight and the upper is zig-zag.

16. J 15, 60 cm. Right forearm of bronze statue. Length, 14 cm. Hand open as if in gesture.

17. L 14, 80 cm. Left arm of bronze statue. Length, finger to elbow, 20 cm. Arm bent at elbow. The hand is half closed with the index finger extended. Just above the elbow is a beautiful braided band with four broad, crosshatched ornaments evenly spaced, and a tie on front. Above this band, the arm had been spliced (apparently a break repaired) by brazing two oblong pieces of bronze, 3.5 cm. by 1.5 cm., on the front and inside of the arm and a beautiful bow tie, 2.5 cm long, on the outside. A similar splice at the wrist has a patch of the same kind on the inside, and on the outside a bracelet of two rope-like strands separated by a flat piece 5 cm. wide.

18. M 13, 30 cm. Left foot of bronze statue. Length of foot, 21 cm. Height of leg preserved, 16 cm. It wears a heavy-soled sandal with loops 5 cm. high on each side of the heel. A strap, 1 cm. wide, passes between the big and second toes, then through the loop and around the heel. The bottom of the foot is hollow. The ankle is thick and shapeless. Plate 205.

19. G 3, near level of late floor. Fore part of right foot of bronze statue. Length, 7.5 cm. Width, 4 cm.

20. E 11, on floor. Fore part of foot with sandal of bronze statue. Length, 6.5 cm. Width, 4.3 cm.

21. O 11, on court floor. Limestone statue base with two bronze feet leaded into foot holes. Toes on left foot are visible, but right foot is completely covered with lead. Length of foot (sole), 7 cm. Depth of holes, 2 cm.

22. D 8, on floor. Bronze statuette of woman. Height, 17.5 cm. Right arm and feet missing. She stands with her weight on the right foot, the left leg bent at the knee, and the heel raised. The left hip is raised in a "hip-shot" position. The upper part of the body is turned slightly to the left so that the left shoulder and arm are back farther than the hip. The left shoulder is also raised. The left arm is tight against the body and bent about 45°

No clasp or other means of holding the paws in place is indicated. The lion's head hugs the back of the man's neck and its tail hangs to the edge of his skirt. The head of the lion is small and almost unrecognizable and the paws look like human hands. Apparently the lion skin was extremely thin, for the shape of the man's shoulder blades is distinctly visible through it.

His hair is indicated by concentric rows of knobs converging at the crown of the head (see E. Gjerstad, *The Swedish Cyprus Expedition*, III Plates, Stockholm, 1937, Pl. 17: 1-2). As shown at the edge, it is 3 layers in thickness. A double band of ribbons, tied on the left side just above the ear, encircles his head. At one point on the right side the ribbons project abruptly, leaving a small hole for the insertion of some ornament. At the present time, the Bedouins of South Arabia still tie their hair with a ribbon.

His arms extend before him; the right is raised more than the left. In the right hand he probably held a staff which had been inserted through the hole in his fist. With his closed left hand and between his second and third finger, he holds a round seal, 2.5 cm. in diameter, with a design which now appears only as an oval boss. Just above the elbow of his left arm is a narrow ribbon with a single tie on the outside.

The torso is modeled in broad, flat planes. Two small folds of flesh at the base of the neck probably represent the collar bones. The legs are straight, with a sharp ridge running down the front and a curved incised line from the ankles to the knees outlining the muscles of the calves. Another sharp ridge runs up the front of the neck, which is slightly conical, tapering upward to the broad, stiff head. The eyes are large and conventionalized; the irises are indicated by incised circles in the center of the eyeballs. The eyebrows are sharp ridges above the eye sockets and follow the curve of the upper eyelids. The nose is large, slightly arched in profile, and the nostrils are deeply indented. The mouth is a rather short, narrow slit, and a lightly incised line runs down each side of it from the nose to the chin. A beard of tight curls, indicated by rows of knobs, extends from the temples to below the chin. He has no mustache. The ears are large and simply modeled, with large bulbous lobes.

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<i>y'it/bn/kr(?) →</i>	<i>y'aṭat, of [the family of] Kar(?)</i>
<i>t/hqny/'l ←</i>	<i>at, has dedicated to 'Il-</i>
<i>[mq]h/slmn/ghb →</i>	<i>[umq]uh this statue in gold</i>
<i>n/ . . . ←</i>	<i>.</i>

The name Ma'adkarib at the beginning of the inscription on the left shoulder appears to be the name of the statue of the man represented.

When the statue was found both arms and the right foot were broken off. The left foot was bent up sharply and nearly broken off. The writer repaired these breaks with iron rods (the only available metal) and cement, and painted the exposed cement with a paint made from the green copper oxide brushed from the statue.

The bronze is cast over a core of black carbon-like substance into a shell about 2 to 3 cm. thick. It is fairly uniform in thickness except that the inner surface does not follow the small contour irregularities of the outer surface as far as could be determined. No indication of seams, vents, or pour holes of the mold was detected.

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12. L 13, 60 cm. Bronze statue of a young man (Plates 199, 200). Height, 43 cm. with most of the legs below the knees missing. The head was broken off low into the chest. A large crack extended down the back of the right shoulder to the hip, and another down the front from below the right arm. There is a third crack below the left arm extending to the hip. The right shoulder was twisted forward and outward. The edges of the breaks were considerably bent and a few pieces of the back were missing. A large piece was broken out of the top and back of the head and was found several meters from the statue. It had already been broken in antiquity and a new piece had been made, with the hair more crudely rendered than on the original. It was secured to the head by means of four bronze rivets which project crudely on the surface. A bronze plate, slightly larger than the hole at several points, was riveted to the new piece. After it was inserted into the hole, the cavity was filled through gaps around the poorly fitted patch with some substance to hold the plate against the edges of the break. The writer repaired these breaks again. The left knee had been broken and brazed. It is now broken below the upper edge of the ancient repair. The right arm had also been broken and fusion-welded by pouring molten bronze into a mold placed around the break; the repair resembled an arm band with floral design. A strut above the hip braces the left arm.

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left. Around his neck he wears a braided necklace with a pendant, 2.1 cm. long, decorated with crosshatching.

His head is covered with rows of protruding knobs representing the hair. Around the forehead a smooth band projects slightly below the knobs. Originally the curly hair was probably represented by knobs, but through the course of time the curly became so conventionalized that the artist no longer knew what the knobs represented. He copied them simply as an artistic convention. Statue no. 13 has distinct strands of hair projecting at the temples from beneath the knobs.

The small ears project in front of the hair. The eyes are large, pointed ovals set between thin eyelids. The nose is large, straight, and rather well modeled; the mouth straight, small, thick-lipped, and sober; the chin well modeled; and the neck very thick. The face is smooth-shaven.

The arms project forward from the elbows. The right hand is open and raised, as in gesture. The left is closed with a rectangular hole through the fist where it once grasped an object, probably a staff.

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On his chest is a ten-line boustrophedon inscription:

<i>ȝf'mr/ȝwȝf, nȝhnh/</i>	Yata'amar and Muvaliy', the
<i>bny, ȝt'hnuwȝhquȝ/ȝt/</i>	two Natahit.
<i>ȝh/b'l/ȝwȝ, rȝhdm/</i>	of (the family of) Sarahumu,
<i>ȝhnu/ȝbnyhmu/ȝt/</i>	have dedicated to 'Umm
<i>d'l/ȝ krb'ȝt/bdt</i>	quh, Master of 'Awwām, these
<i>hufȝhyȝ/ȝlugh</i>	two statues
<i>ȝt/tnb'ȝw/</i>	in gold, and their two sons, Zay-
<i>wȝhcfynh</i>	d'il and Karib'afat, because
<i>mu'b'ȝtr/</i>	'Ummquh has granted them both
<i>w'lmqh</i>	[the sons]
	as He [Ummquh] had prom-
	ised to him [Yata'amar]
	and [because] He will grant
	them. By 'Atar
	and 'Ummquh.

13. D.E. 13, 35 cm. Bronze statue of a man (Plates 201-203). Height, c. 50 cm. When found the legs were intact to the ankles and the total height was 67 cm. But the bronze of the legs was entirely oxidized to a powder and some small fragments. The black core was soft, so that the legs could not be saved. Perhaps the small pile of lime plaster in contact with the legs caused this rapid deterioration. The head was broken off, but lying nearby. The right arm was found a meter away. The body is considerably cracked from the swelling of the core.

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15. J 11, 30 cm. Right arm of bronze statue. Length, 21 cm. Length of hand, 10 cm. Similar to last except that it is slightly smaller and the hand is bent back more at the wrist. The fusion-weld on the arm is more neat. The lower edge of the weld is straight and the upper is zig-zag.

16. J 15, 60 cm. Right forearm of bronze statue. Length, 13 cm. Hand open as if in gesture.

17. L 11, 40 cm. Left arm of bronze statue. Length, finger to elbow, 20 cm. Arm bent at elbow. The hand is half closed with the index finger extended. Just above the elbow is a beautiful braided band with four broad, crosshatched ornaments evenly spaced, and a tie on front. Above this band, the arm had been spliced (apparently a break repaired) by brazing two oblong pieces of bronze, 3.5 cm. by 1.5 cm., on the front and inside of the arm and a beautiful bow tie, 2.5 cm. long, on the outside. A similar splice at the wrist has a patch of the same kind on the inside, and on the outside a bracelet of two rope-like strands separated by a flat piece 5 cm. wide.

18. M 13, 30 cm. Left foot of bronze statue. Length of foot, 21 cm. Height of leg preserved, 16 cm. It wears a heavy-soled sandal with loops 5 cm. high on each side of the heel. A strap, 1 cm. wide, passes between the big and second toes, then through the loop and around the heel. The bottom of the foot is hollow. The ankle is thick and shapeless. Plate 205.

19. G 3, near level of late floor. Fore part of right foot of bronze statue. Length, 7.5 cm. Width, 1 cm.

20. E 11, on floor. Fore part of foot with sandal of bronze statue. Length, 6.5 cm. Width, 4.3 cm.

21. O 11, on court floor. Limestone statue base with two bronze feet leaded into foot holes. Toes on left foot are visible, but right foot is completely covered with lead. Length of foot (sole), 7 cm. Depth of holes, 2 cm.

22. D 8, on floor. Bronze statuette of woman. Height, 17.5 cm. Right arm and feet missing. She stands with her weight on the right foot, the left leg bent at the knee, and the heel raised. The left hip is raised in a "hip-shot" position. The upper part of the body is turned slightly to the left so that the left shoulder and arm are back farther than the hip. The left shoulder is also raised. The left arm is tight against the body and bent about 45°.

at the elbow with the hand closed at the hip. The right arm was free of the body and extended somewhat forward and sidewise.

She wears a thin, long dress (*stola*) with sleeves nearly to the elbows and a heavy cloth (*palla*) draped over the left shoulder and wrapped around the hips. It is impossible to follow the contours of the drapery, for the artist obviously did not understand what he was reproducing. One cannot be sure whether the zig-zag edge down the front and below the heavy fold belongs to the *palla* or the thinner *stola*. Above the folds, she wears a sash around the waist with ends hanging down the right side and with a large knot with two loose ends at the front. There is also a strap over the right shoulder which becomes lost in the cloth at the waist.

Her curly hair falls on the shoulders and she wears a wreath or tiara on her head which follows the outline of the hair around her face. It has a knoblike object at the front.

The statuette does not seem to be an import, but the Greco-Roman influence is unmistakable. Its feeling and drapery style are reminiscent of Roman work of about the first century A.D. from which it probably stems.

23. O 16, on floor. Bronze statuette of woman. Height, 7.3 cm. Right leg missing. She stands with both arms extended forward from the elbows. The right hand is open with the thumb up, but the left is closed, holding some object a part of which remains below the forearm with a tail-like appendage extending to the left. It may be an animal or one of the flaring loose ends of her dress. Since she wears a dress reaching only below the knees and slightly flaring at the bottom, she may reflect Diana as her prototype. The top part of the dress is not distinct, but seems to have had loose ends flaring outward and slightly backward from the hips. Her curly hair falls on her shoulders.

24. G 9, 1.20 m. Bronze statuette of woman. Height 6.2 cm. Feet missing. The left arm is bent at the elbow with hand closed. The right arm is bent slightly forward from elbow with hand open and thumb extended.

25. O 8, on floor. Bronze statuette of woman. Height, 12 cm. plus a 5-mm. tenon under the feet for fastening. She stands stiffly erect, both arms extending forward from elbows, hands half closed as if holding an object. She is very flat, only 1.2 cm. thick at the pelvis. There is no indication of breasts. The face is sketchy with bulging eyes and nose. Her dress has the opening at the front with a ribbon tied at the throat and long ends hanging down nearly to the elbows. Folds in the dress are indicated by straight lines. The feet are molded together with the metal tenon.

26. H 17, 80 cm. Bronze statuette of woman. Height, 6.6 cm. Forearm and legs below knees are missing. Black core inside.

27. O 14, on floor against wall. Bronze statuette of woman, poorly preserved. Height, 8.3 cm. Left arm, feet, and some of right side of dress missing.

28. L 14, near floor. Bronze statuette of woman, poorly preserved. Height, 5.3 cm. Only head and body to the hips preserved.

29. O 8, on floor. Bronze statuette of woman. Height, 5.5 cm. Width at shoulders, 3.2 cm. Preserved only from waist up and in poor condition. Right arm extended from elbow, left missing. Front of dress cut in low "V."

30. L 13, on floor. Bronze statuette of woman (?). Poor condition. Height, 5.5 cm. Only head, body, and part of left arm preserved.

31. O 8, on floor. Bronze statuette of woman. Height, 4 cm. complete. Whole right arm extended forward and

sidewise as if in gesture. Left arm bent at elbow. She is holding a basket or similar object.

32. H 13, on floor. Bronze left hand and forearm. Length, 5.8 cm. Width of fist, 2 cm. Hand closed as if holding a staff or similar object. On wrist there is a bracelet or sleeve cuff.

33. N 17, on top of wall (3 m. above floor). Bronze right hand and part of arm of small statuette. Length, 2.6 cm. Palm open. Fingers are not indicated separately.

34. G 11, on floor. Bronze left hand holding a dish (*phiale*) with raised center (*mesomphalos*), or possibly a shallow dish with a round object on it. Length, 3 cm. Dia. of dish, 1.5 cm.

35. C 12, 1.5 m. Bronze foot of statuette with tenon for fastening. Height, 3 cm. Length 3.3 cm.

36. E 7, 2.20 m. Bronze foot of statuette with tenon for fastening. Height, 2 cm.

37. E 7, near floor. Bronze head of bull. Height, 2.8 cm. Width across horns, 3.6 cm.

38. Mausoleum G 8, 60 cm. Bronze foot of bull. Height, 2.4 cm. Width of hoof, 1.7 cm.

39. Surface, from Mārib. Bronze cat in sitting position. Height, 2.8 cm. On back of collar is a loop for suspending. Beautifully made and very Egyptianizing. Probably an import from Egypt.

40. Mausoleum K 8, 60 cm. Marble head from grave stele. Male. Height, 27 cm. Width, 13 cm. Thickness, 13 cm. Length of neck, 8 cm. Nose missing and face somewhat battered. Beard from temples to below the chin and a small tuft below lower lip indicated by picking. Plate 206.

41. Mausoleum H 5, 1.20 m. Marble head from grave stele. Male. High relief on a plaque 23 by 13 cm. Thickness, 8.5 cm. Tip of nose, inset eyes, and eyebrows are missing. Below lower lip is a hole with round piece of bronze leaded in and broken off. A ridge from temples to below the chin indicates the beard.

42. Mausoleum J 4, 1.30 m. above floor of subfloor chamber. Marble head from grave stele. Male. Height, 18 cm. Width, 15 cm. Thickness, 12 cm. Nose, inset eyes, and eyebrows missing; neck broken off close to chin. Considerable discoloration (iron oxide) in spots. No beard. Small mouth. Large vertical ears (7 cm.).

43. Mausoleum F 7, 1.10 m. Marble head from grave stele. Height, 21 cm. Width, 15 cm. Pinkish marble. Smooth and rather flat face. The eyes and small mouth are only faintly indicated. Nose broken.

44. Original ground level against south side of temple wall. Marble head from grave stele. Female. Height, 23 cm. Width, 17 cm. Thickness, 9 cm. Tip of nose missing. Chipped in hair over left ear, on lower right side, and on chin. Hair indicated by rough tooling. Rather square on top of head and sides. Large ears indicated on front of hair. Eye sockets, 2 by 4 cm. and 1 cm. deep, made by drilling. Eyebrows similarly made by drilling rows of holes 9 mm. deep. A ridge, 5 cm. wide, around the hair at the back of the head facilitates fastening the stone.

45. C 9, 4 m. Marble head from grave stele. Female. Height, 22 cm. Width, 13 cm. Thickness, 8.5 cm. Front of forehead and nose missing. Lips and chin chipped. Smooth, but not polished. Rasp marks showing in hair. Small ears only outlined. Eye sockets, 1.5 by 3.5 cm., 1 cm. deep, drilled, and chiseled. Line of drill holes horizontally through center.

46. Surface, from Mārib. Marble left arm, perhaps of doll. Length, 4.3 cm. Thumb and forefinger missing. The arm is fat, like that of a baby. A ridge around the wrist indicates either the cuff of a long tight sleeve or a bracelet.

47. H 14, on floor. Marble relief of a fish. Only the hind half found. Length, 17 cm. Width, 14 cm. Height of relief, 2 cm. The fish was carved on a flat stone which had previously been polished, but was not repolished after the cutting. The stone broke through a 2-cm. deep vertical channel which had been cut for the attachment of an object.

48. J 17, 1.50 m. Marble relief of winged animals, griffins or winged lions. Plaque 17 cm. long, 19 cm. high, 9.5 cm. thick. Relief, 5 mm. high. At left, an animal stands nearly erect, facing right, behind another animal only the tail of which is preserved.

49. E 16, 50 cm. Marble bull on base. Length, 20 cm. Height, 25.5 cm. Height of bull, 17 cm. Height of base, 8.5 cm. Horns, ears, nose missing. Body and base slightly chipped. The base consists of five diminishing stages (see monument bases nos. 6 and 7 above). On it stands a squarish bull with the stone still remaining between the base and his body. He is nicely modeled and highly polished. The hoofs, and the anatomy in general, are quite accurately indicated. The horns had been fastened by means of dowels or tenons. Plate 207.

50. E 16, 50 cm. Marble bull. Length, 18 cm. Height, 14 cm. Small pieces missing. Conventionalized.

51. E 16, 50 cm. Marble bull. Length, 14 cm. Height, 10 cm. Large chip off haunches.

52. C 16, 50 cm. Marble head of bull. Length, 10 cm. Conventionalized.

53. F 15, on floor. Marble bull. Head missing. Length, 22 cm. Height, 24 cm. Width of body, 7.5 cm. Width of base, 10 cm. He stands on a base consisting of two stages on the sides, but straight on the ends. The marble is not cut away under the body and between the legs. The legs are long. The body is squarish and particularly flat on the sides. Plate 208.

54. H 17, 70 cm. Marble bull. Length, 25 cm. Height, 15 cm. Width, 12 cm. Head and haunches missing. Legs extend only to knees. Possibly the stone had been spliced.

55. N 15, on bottom step. Marble bull. Length, 16 cm. Height, 8.5 cm. Only the rear part of body preserved. Squarish style.

56. C 8, 1.50 m. Marble bull. Length, 12.5 cm. Width of shoulders, 7 cm. Head and legs missing. Bulky, but nicely modeled.

57. O 7, near floor. Marble bull. Length, 15 cm. Head and legs missing.

58. F 13, 50 cm. Marble bull. Length, 15 cm. Height, 9.5 cm. Head and legs missing.

59. D 14, 75 cm. Marble bull. Length, 9.5 cm. Height, 4.5 cm. Head and feet missing. It has a shoulder hump similar to the Brahman cattle of modern Arabia.

60. E 15, 1 m. Marble bull. Length, 13 cm. Height, 17 cm. Width, 8.5 cm. Head and lower part of legs missing. Stone retained between base and body. Squarish and conventionalized.

61. F 16, 75 cm. Marble bull. Length, 12 cm. Height, 8 cm. Head and feet missing. Conventionalized.

62. Mausoleum G 8, 60 cm. Marble bull. Length, 10 cm. Height, 8 cm. Width, 6 cm. Only the hind half found.

63. N 11, 50 cm. Bull's head of brown stone. Height, 3.5 cm. Horns and ears missing. It had been a decorative element on the rim of a stone vase, projecting 1.5 cm. from body of vase. Thickness of vase rim 7 mm.

64. C 13, 2 m. Terra-cotta figurine of woman. Height, 8 cm. Head, right arm, and left foot missing. Very roughly made by hand and lightly fired (probably baked in the sun). The arms are short stubs projecting to the sides with a few incised marks for fingers. The feet are short projections pinched forward from the bottom of the

trunk, with similar marks for toes. The trunk probably represents the body in long dress.

65. N 11, 30 cm. Terra-cotta figurine of woman. Height, 9 cm. Head, left arm, and legs missing. Red clay. Similar to no. 64.

66. Mausoleum, near surface level. Terra-cotta figurine of woman. Similar to no. 64.

67. C 7, 3.20 m. Terra-cotta figurine of camel. Length, 9 cm. Head and legs missing. Roughly made by hand and lightly baked. The head, legs, and hump squeezed out of a lump of clay which formed the body. Similar to H. Th. Bossert, *Altsyrien* (Tübingen, 1951), 1340, 1341.

68. Surface. Four similar camels found about the village of Mârib and one from the south side of the temple. They range in size from 11 to 14 cm. long. One has only a front leg missing. All others are more fragmentary.

69. South of temple wall, in fill. Two sherds of a wide bowl. Dia., 24 cm. Height, 10 cm. Brick-red clay. Plate 193: 69.

70. J 7, 1 m. Small bowl. Dia., 10 cm. Height, 3.5 cm. Dia. of base, 6.5 cm. Light-red clay. Base was thrown separately and pinched on with the fingers. Plate 193: 70.

71. J 9, on floor. Bowl sherd. Dia. of base, 10 cm. Height, 9 cm. Coarse red clay. Shape similar to no. 70.

72. C 8, within 1 m. above floor. Fragment of shallow bowl. Height of sherd, 4 cm. Incised vertical lines, 2.5 cm. long, decorating outside of rim.

73. C 8, 3.20 m. Bowl. Dia. of rim, 10 cm. Dia. of base, 8 cm. Height, 6 cm. Coarse and soft red clay. Wheel-made. Plate 193: 73.

74. South of temple wall, within 1.5 m. above ground level. Jar. Dia. of rim, 4.5 cm. Height, 8 cm. Red clay. Wheel-made. Round body with rim and ring base nearly 2 cm. high. Plate 193: 74.

75. South of temple wall, within 1.5 m. above ground level. Jar similar to no. 74, but slightly taller. Dia. of base, 4.4 cm.

76. O 7, near floor. Jar similar to no. 74. Height, 7 cm. Dia. of base, 5.4 cm. Rim missing.

77. South of temple wall, within 1.5 m. above ground level. Jar similar to no. 74 except less abrupt joint between base and body. Top missing. Dia. of base, 3.7 cm. Height preserved, 4 cm. Red clay.

78. South of temple wall, within 1.5 m. above ground level. Round jar. Most of base missing. Dia. of rim, 4 cm. Height, 6.2 cm. Plate 193: 78.

79. K 14, 2 m. Wheel-made jar of brick-red clay. Unpolished. Dia. of body, 9 cm. Dia. of base, 7 cm. Height preserved, 9 cm. Rim missing. Plate 193: 79.

80. N 15, 2.50 m. Plain red-clay jar similar to no. 79. One side missing. Dia. of rim, 8 cm. Dia. of base, 7 cm. Height, 11 cm.

81. K 8, 3 m. Two jar sherds. Coarse red clay. Dia. of base, 5.6 cm. Height, 10 cm. Plate 193: 81.

82. D. 13, 3 m. Jar with narrow mouth. Part of base missing. Dia. of body, 7.5 cm. Dia. of rim, 4.8 cm. Dia. of base, 7 cm. Height, 9 cm. Plate 193: 82.

83. M 12, 1.50 m. Rim sherd of cup or small bowl. Red clay, rough finish.

84. South of temple wall, within 1.5 m. above ground level. Jar similar to no. 78 except smaller neck. Part of rim missing. Dia. of base, 6.5 cm. Dia. of rim, 4 cm. Height, 8 cm.

85. South of temple wall, within 1.5 m. above ground level. Tall jar. Top missing. Dia. of base, 5.5 cm. Dia. of body, 5.5 cm. Height preserved, 9 cm. Plate 193: 85.

86. K 13, 2 m. Tall jar similar to no. 85, except sides are straighter. Vertical lines incised on body. Dia. of base, 5.4 cm. Height preserved, 9 cm.

87. G 9, near floor. Tall jar of smooth red clay, square shoulders, and straight, slightly concave sides. Bottom missing. Dia., 7.5 cm. Height preserved, 11.5 cm. Height of neck, 2.2 cm. Plate 193: 87.

88. C 12, within 1 m. above floor. Fragment of jar with vertical and slightly concave sides. Smooth brick-red clay. Dia., 7.5 cm. Height, 7 cm. Plate 193: 88.

89. E 8, 2.50 m. Hand-made jar with two ribs down the sides. Burnt black and very hard. Dia., 3.4 cm. Height, 5 cm. Plate 194: 89.

90. South of temple wall, within 1.5 m. above original ground. Small hand-made jar. Height, 3 cm. Plate 194: 90.

91. South of temple wall, within 1.5 m. above original ground. Small hand-made bowl, more squat than no. 90. Dia., 4 cm. Height, 4 cm. Depth, 3.2 cm. Plate 194: 91.

92. L 8, within 1 m. above floor. Chalice on tall foot. Dia. of rim, 6.5 cm. Dia. of base, 6 cm. Height, 8 cm. Plate 194: 92.

93. South of temple wall, within 1.5 m. above ground level. High base sherd. Dia., 6.5 cm. Height, 5 cm. Depth inside base, 4.5 cm. Plate 194: 93.

94. G 7, 2 m. above floor. High base sherd. Dia., 5 cm. Height, 10 cm. Dia. of body, 2.5 cm. Plate 194: 94.

95. From a house (or tomb) east of temple. Tall jar. Dia., 19 cm. Dia. of base, 14 cm. Dia. of rim, 13 cm. Height, 39 cm. Complete. Red clay. Wheel-made. Globular body with long conical neck and base. Plate 194: 95, drawn from memory.

96. K 12, 1 m. Junction of base and body of jar, perhaps similar to no. 95. Dia., 8 cm.

97. South of temple wall, within 1.5 m. above ground level. Shallow disk-like saucer. Dia., 7.2 cm. Height, 2 cm.

98. J 8, 2 m. Sherd of red-clay plate divided into compartments. Dia., c. 15 cm. Height, 2.5 cm. (outside measurements).

99. Mausoleum H 2, near floor. Sherd of hand-molded vase with thin, golden-green glaze. Length, 4.5 cm. Height, 2.4 cm. A great quantity of pottery of this type was found in Dhofar, Oman, which will be published in the near future.

100. B 14, 3.30 m. above floor level (on wall). Sherd of heavy vessel of coarse, green clay. Striations in section show that the clay has been drawn out in "throwing" on the wheel. Length of sherd, 15 cm. Height, 6 cm. Depth, 3.4 cm. Straight sides. Bottom raised in center. Pottery of this type was also found in Dhofar.

101. K 13, on floor. Funnel-shaped rim and neck of large amphora-like jar. Dia. of rim, 12.8 cm. Dia. of neck outside 7 cm., inside 2.6 cm. Made either by hand or on slow wheel of coarse, brick-red clay. Unpolished.

102. Mausoleum F 4, 1.80 m. above floor of subfloor chamber. Rim of amphora-like jar. Dia., 15 cm. Dia. of neck inside 3 cm., outside 7 cm. Inscription on top of rim. Plates 192: 102 and 194: 102.

103. H 9, 1.50 m. Part of rim of crater-like vessel. Dia. c. 26 cm. (inside). Light-red clay. Inscription on rim.

104. C 14, 1.50 m. Crude hand-made lid of brick-red clay. Dia., 5.5 cm. Pinched to a point on top. Bottom slightly concave. Several of these were found varying in diameter from 3.5 cm. to 5.5 cm. Plate 194: 104.

105. South of temple wall, within 1.5 m. above ground level. Stone vase. Top missing. Dia. of base, 2.9 cm. Height, 4.2 cm. Depth, 2.6 cm. Plate 194: 105.

106. H 14, 3.50 m. Shallow stone vessel. Dia., 3 cm. Three very small feet on bottom. Plate 194: 106.

107. South of temple wall, within 1.5 m. above ground level. Shallow stone cylindrical vessel. Dia., 6 cm. Height, 5.2 cm. Depth, 1 cm. Plate 195: 107.

108. J 8, 3 m. Broken mortar with pouring lip. Dia., 7 cm.

109. F 14, 4 m. Stone vessel. Dia., 8.5 cm. Height, 4.5 cm.

110. Mausoleum F 2, 1 m. Half of three-legged stone vessel. Dia., 6 cm. Height, 4.2 cm. Depth, 2.5 cm.

111. South of temple wall, within 1.5 m. above ground level. Fragment of ribbed cup. Vertical ribs. Plain rim.

112. G 3, 2.5 m. Miniature stone cup. Dia., 1.8 cm. Height, 1.7 cm.

113. South of temple wall, within 1.5 m. above ground level. Handle of coarse red stone cup. Length, 4 cm. Projects 2 cm.

114. South of temple wall, within 1.5 m. above ground level. Fragment of well-made stone vessel. Dia., 3.6 cm. Height preserved, 3.6 cm. Thickness of bottom, 5 mm. Thickness of sides, 3 mm. Straight sides and flat bottom. Plate 195: 114.

115. South of temple wall, within 1.5 m. above ground level. Fragment of shallow stone saucer. Height, 2.4 cm. Thickness of bottom, 1.2 cm. Depth, 7 cm. Bottom concave. Plate 195: 115.

116. H 14, 5 m. Gray stone cover. Dia., 3.5 cm. Convex top and concave bottom within small ridge. Plate 195: 116.

117. K 7, 2 m. Rectangular stone box. Length, 8.7 cm. Width, 4.2 cm. Height, 2.9 cm. Depth, 1 cm.

118. F 3, 2.50 m. Square box or incense table of yellowish stone. Roughly made. 4 cm. square. Height, 2 cm. Depth, 2 mm.

119. F 3, 4.50 m. Incense altar with four legs. One corner and three legs missing. Tan-colored stone painted red outside. Four lines roughly incised around the top after painting. Near the bottom is another line with vertical lines drawn from it, incised before painting. Legs are not painted. 5 cm. square. Height, 4.3 cm. Height of legs, 1.8 cm. Depth, 1 mm.

120. Mausoleum F 4, 1.70 m. above floor of subfloor chamber. Three-legged shallow stone vessel or incense altar. Dia., 5.1 cm. Height, 2.6 cm. Height of legs, 5 mm. Depth, 3 mm.

121. Mausoleum F 4, 1.70 m. above floor of subfloor chamber. Shallow vessel or incense altar without legs, slightly rounded bottom. Dia., 4.2 cm. Height, 1.3 cm. Depth, 4 mm.

122. G 11, on floor. Fragment of alabaster incense altar (?) with cornice of two rows of raised tegular panels separated by a plain narrow band. Height of fragment, 10 cm. Width, 4.5 cm. Depth, 3 cm. Plate 195: 122.

123. Mausoleum F 4, 1.50 m. above floor of subfloor chamber. Miniature stone altar with bull-head spout on side of altar table. Length, 11 cm. Width, 3.5 cm. Thickness, 3 cm. Length of spout, 3 cm.

124. Mausoleum F 4, 1.50 m. above floor of subfloor chamber. Miniature stone altar table with a second section on one end. Plain spout. Total length, 8 cm. One part is 5 cm. square, the other is 3 cm. long and 3.3 cm. wide. Plate 195: 124.

125. Mausoleum F 4, 1.50 m. above floor of subfloor chamber. Fragment of miniature alabaster altar somewhat similar to no. 124, but with feet 7 cm. high. Height, 4.3 cm. Frieze of raised tegular panels around top and bottom. Plate 195: 125.

126. Mausoleum F 4, 2 m. above floor of subfloor chamber. Miniature stone altar. Spout, which was on the end, is missing. Length, 11.5 cm. Width, 10.3 cm. Height, 2 cm.

127. Mausoleum G 8, 1 m. Miniature marble altar. Total length, 7.8 cm. Length of table, 5.8 cm. Length of spout, 2 cm. Width, 6.3 cm. Height 2 cm.

128. K 8, within 1 m. above floor. Fragment of table

from miniature marble altar. Length preserved, 5.5 cm. Width, 7 cm. Height, 2.2 cm.

129. C 8, 3.20 m. Fragment of miniature altar table with bull-head spout. Length preserved, 7 cm. Length of spout channel, 3 cm. Stylized bull-head somewhat chipped. Plate 195: 129.

130. E 15, 1 m. Two fragments forming complete altar table with plain spout. Table top badly crumbled and eroded by exposure to fire and water. Two altars similarly eroded were found *in situ* in the temple 'Ilu at Khôr Rôri in Dhofâr, Oman (see Frank P. Albright, "The Himyaritic Temple at Khor Rory (Dhofar, Oman)," *Orientalia*, 22 Fasc. 3, p. 286 f.). Length, 1.15 cm. Width, 38 cm. Height, 15 cm. Width of spout, 13 cm. Drain channel, 4 cm. wide and 4 cm. deep.

131. G 14, 1 m. Complete altar table. Plain spout. Length, 54 cm. Width, 25 cm. Height, 10 cm. Depth, 1 to 1.5 cm. Spout length, 27 cm. Width, 17 cm.

132. G 11, on floor. Stone altar table. End of spout missing. Total length, 65 cm. Width, 27 cm. Height, 15.5 cm. Inner dimensions: length, 36 cm.; width, 17 cm.; depth, 1 cm. Width of channel in spout, 6.5 cm.

133. South of temple wall. Bull-head altar spout. Length, 19 cm. Width of top, 17 cm. V-shaped drain channel, 6 cm. wide and 5 cm. deep.

134. South of temple wall. Bull-head altar spout. Height, 14.5 cm. Width (preserved), 12 cm. Drain channel, 5.5 cm. wide and 2.6 cm. deep.

135. C 7, 1 m. Fragment of bronze basin. Length preserved, 18 cm. Width, 8 cm. Bottom rounded. Upper half of sides in two bands, the lower band 3 cm. wide and the upper band (rim) 1 cm. wide. Plate 195: 135.

136. M 14, on floor. Miniature bronze saucer with vertical loop handle. Pressed out of a sheet of bronze. Dia., 2.9 cm. Height, 5 mm. Handle, 4 mm. wide, 4 mm. (outside) dia. Plate 195: 136.

137. Mausoleum F 4, 1.50 m. Miniature bronze cup. Body flares out slightly. Height, 2.8 cm. Height of base, 1 cm. Dia. rim, 1.5 cm. Dia. base, 1.4 cm. Plate 195: 137.

138. G 15, 1.50 m. Fragment of a bronze casting, possibly the corner and part of angle-section leg of a box or table. Length, 14.5 cm. Height of foot, 3.5 cm. Plate 195: 138.

139. C 13, 2 m. Miniature box made by bending up sides of a square sheet of bronze. The edge of one side is round. On the opposite side the metal is bent out and down again. This is excellent work on a small scale. 1.2 cm. square. Height, 2 mm.

140. D 15, 3.50 m. Cast bronze hasp. Rectangular loop on side at one end, peg on opposite side at other end. Length, 4.5 cm. Plate 195: 140.

141. E 8, 2 m. Bronze disk, probably a button. Dia., 1.2 cm.

142. C 7, within 1 m. above floor. Bronze disk, probably a button with loop broken off at center. Dia., 2 cm.

143. C 14, 3.50 m. Half of a bronze ring. Outside dia., 2 cm.; inside, 1.6 cm.

144. South of temple. Bronze bracelet, opposite ends open. Long dia., 4.5 cm. Flattened out to width of 1.8 cm.

145. Mausoleum E 3, on floor of subfloor chamber. Gold ball from jewelry. Dia., 1 cm. Made from a thin sheet of gold in two hemispheres which were soldered together. One hemisphere has two holes for fastening, 3 mm. apart, with rims of gold wire soldered on.

146. F 7, within 1 m. above floor. Fragment of bronze molding with raised tegular panels. Rough in back. Length, 9 cm. Width, 5 cm. Thickness, 1.2 cm. Width of panels, 2 cm.

147. M 19, 2 m. Miniature bronze dagger. Length, 6.2 cm. Width, 6 cm. Thickness, 1 mm. Plate 195: 147.

148. F 16, on floor. Iron sword or dagger blade. Broken in three pieces with middle piece missing. One edge is sharp and curves back to a point. Back is straight. Length found, 21 cm. Width, 4 cm.

149. Fragments of about a dozen nails were found at various places. None are full length. There are two types: one is rectangular in section and the other is round in section. The section varies in size up to 1.2 by 2 cm. The heads are roughly rounded and about twice the size of the shank. On one spike the head is splayed from hammering. They all appear to be molded bronze. On some, the point is made by cutting at a bias; on others, two cuts are made at 80° to 90° from each other so that the point is off-centered like an American fence staple. A few small, large-headed tacks appear to be cast.

150. South graves, near surface level. Tan-colored stone block, 2.5 cm. by 2.1 cm., 6 cm. thick. One side is slightly convex and has 6 circles incised around small holes. The edges of this side are beveled. Two ends and one long edge have holes 5 mm. deep. The fourth edge has a cut 2 mm. by 5 mm. Plate 195: 150.

151. F 5, 2.50 m. One wall of stone box. Length, 2.9 cm. Width, 2.1 cm. Thickness, 4 mm. Translucent, milky-white stone with brown striations. Outside polished. Ends beveled 45° to fit adjacent walls of box. Top and bottom square. The corners of the box were cut off and the narrow facet polished.

152. Near floor level in front of west temple door. Stone cone with hole through apex (loom weight?). Height, 10 cm. Dia., 7 cm. Plate 195: 152.

153. D 10, 1 m. Hopper mill stone. Top broken on one side. Height, 45 cm. Dia. top, 40 cm.; bottom 47 cm. outside. Dia. hole in bottom, 3 cm.

154. F 15, 1.25 m. Hopper mill stone. Stone left in the rough outside. Hopper dia., 17 cm. top. Depth, 20 cm. Dia. hole, 5 cm.

155. J 8, 3 m. Gray stone bead. Dia., 2 cm.

156. N 8, near floor. Stone bead. Length, 7 mm. Dia., 7 mm. Dia. hole, 2 mm.

157. South tombs, 50 cm. below surface. Blue glass head. Dia., 7 mm. Width, 4 mm. Dia. hole, 2 mm. Hole considerably worn.

158. South tombs, 50 cm. below surface. White stone or faience bead. Dia., 8 mm. Round with ribbed surface. Similar to G. Caton Thompson, *The Tombs and Moon Temple of Hureidha (Hadramaut)*, (Oxford, 1944), pl. XXXVIII, 5.

159. South tombs, 50 cm. below surface. Shell bead or button with one hole. Dia., 1.5 cm. Thickness, 4 mm. Dia. hole, 3 mm.

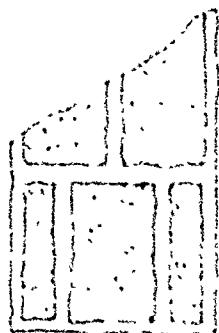
160. South tombs, near surface. Ruby glass bead. Dia., 4 mm. Dia. hole, 1 mm.

161. Mausoleum J 4, 1 m. above floor of subfloor chamber. Fragment of limestone sarcophagus. Height, 30 cm. outside. Sides and bottom, 5 to 6 cm. thick. Handle on side, 19 cm. long, 6 cm. high. Projects 6 cm. Badly chipped. Tan-colored limestone, smoothly cut, but not polished. Plate 195: 161.

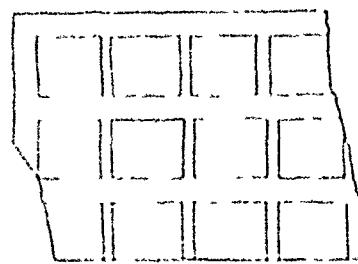
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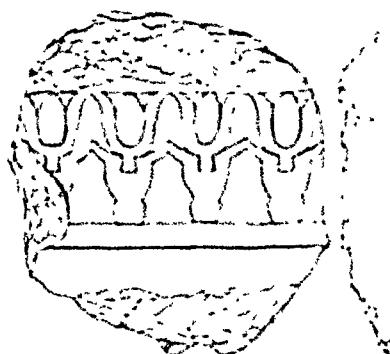
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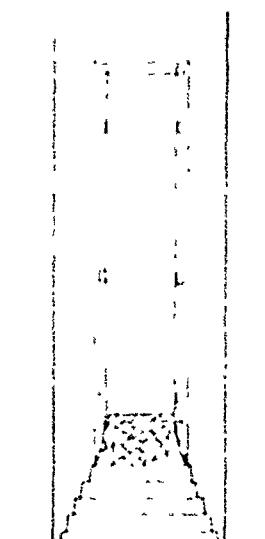
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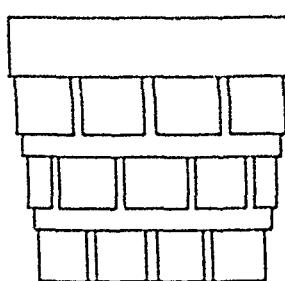
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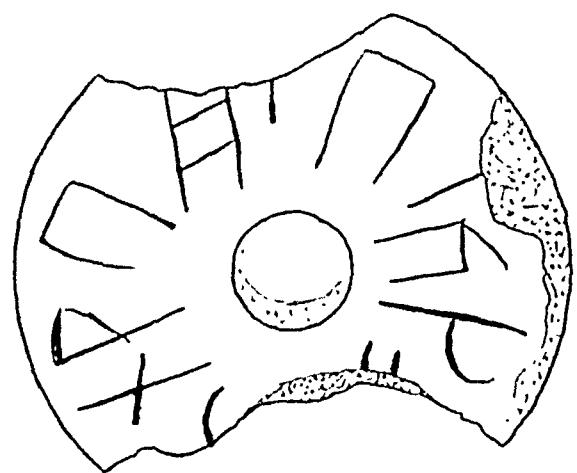
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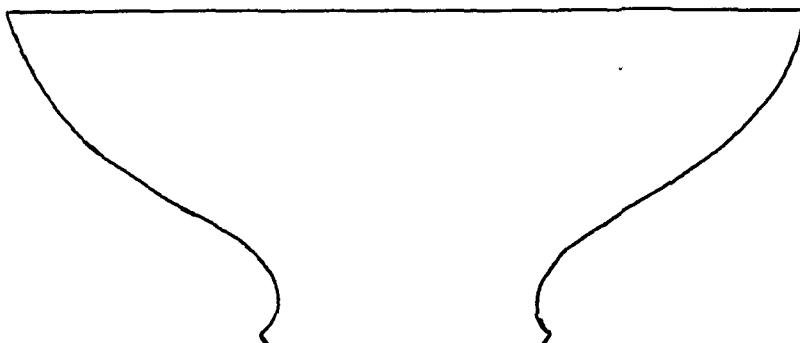


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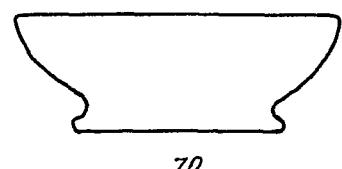


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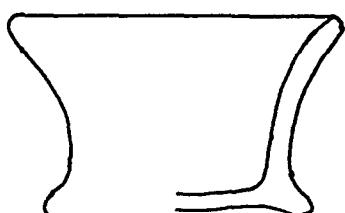
192. Stone objects and pottery.



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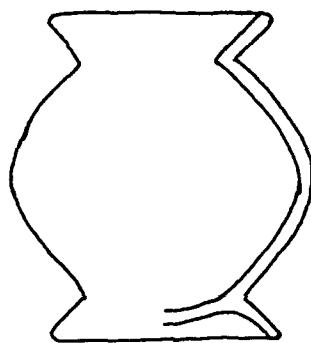
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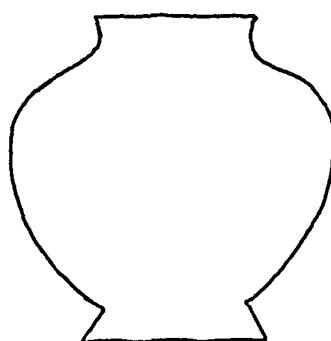
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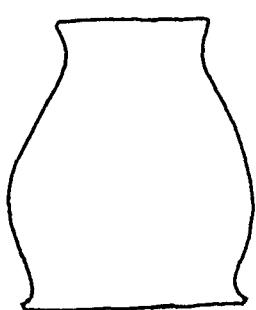
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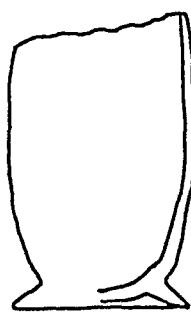
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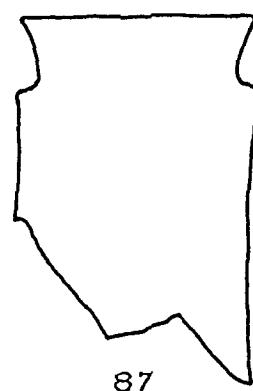
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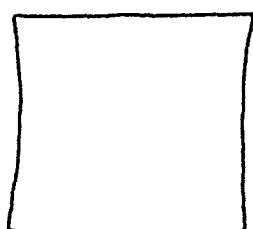
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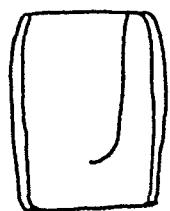


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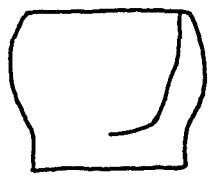


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193. Pottery.



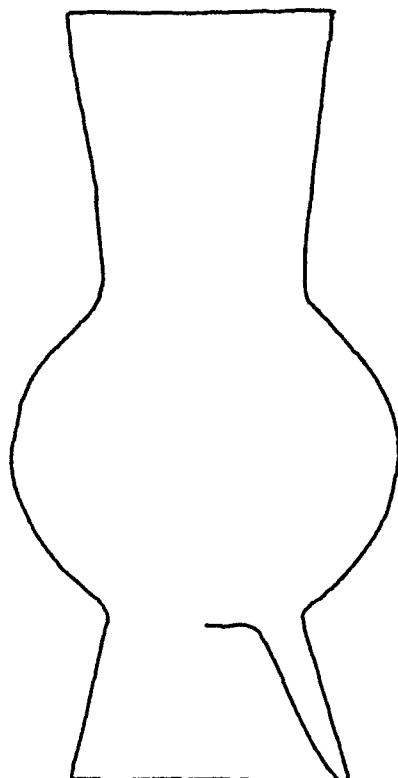
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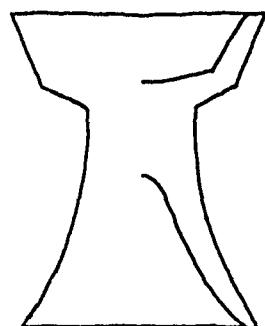
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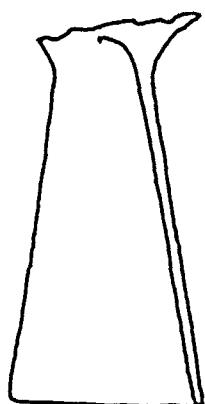


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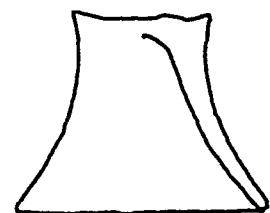
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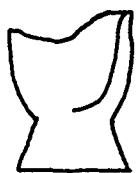
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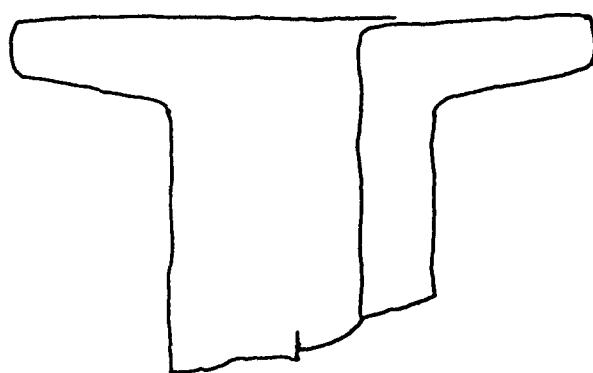
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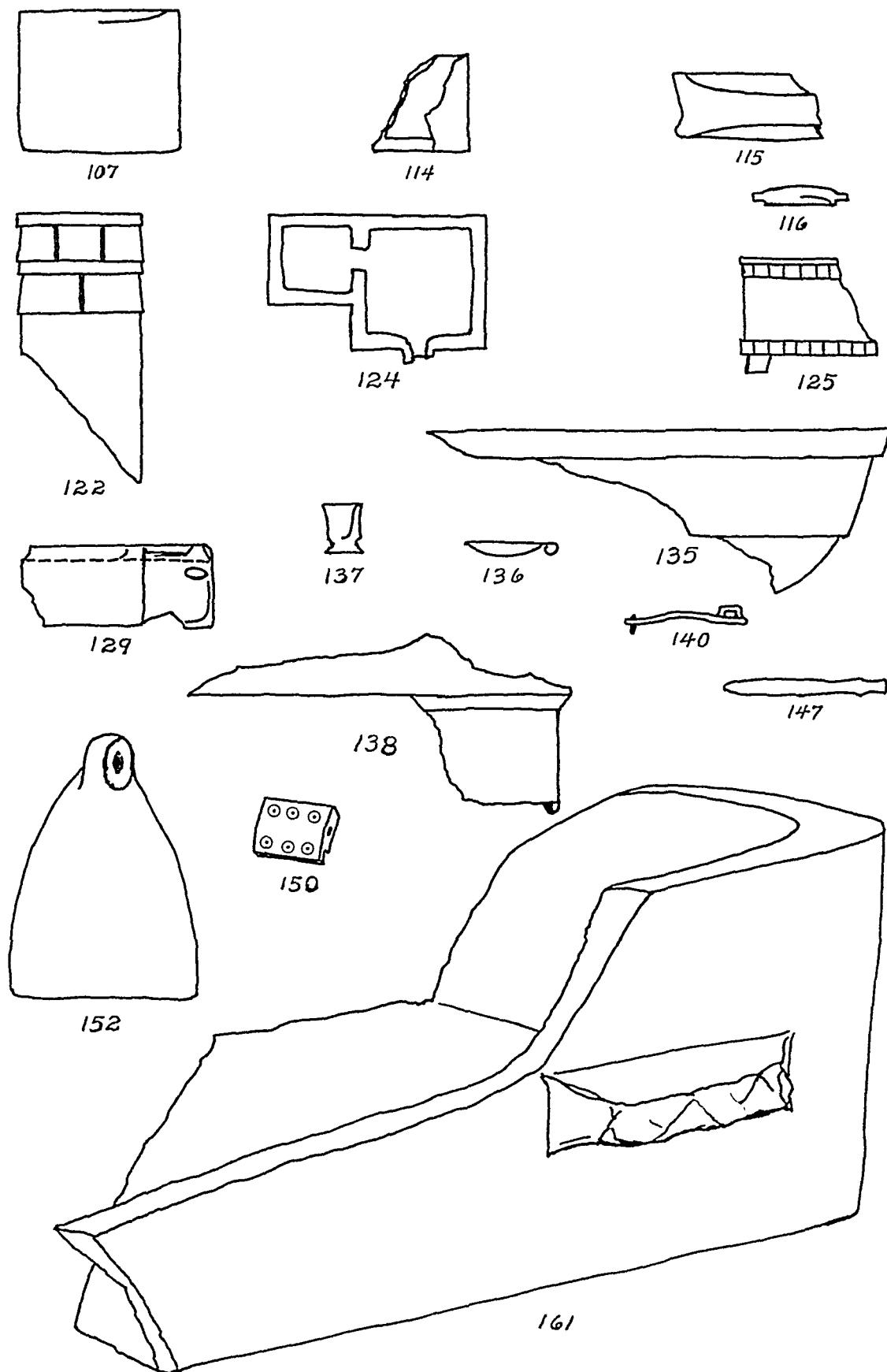


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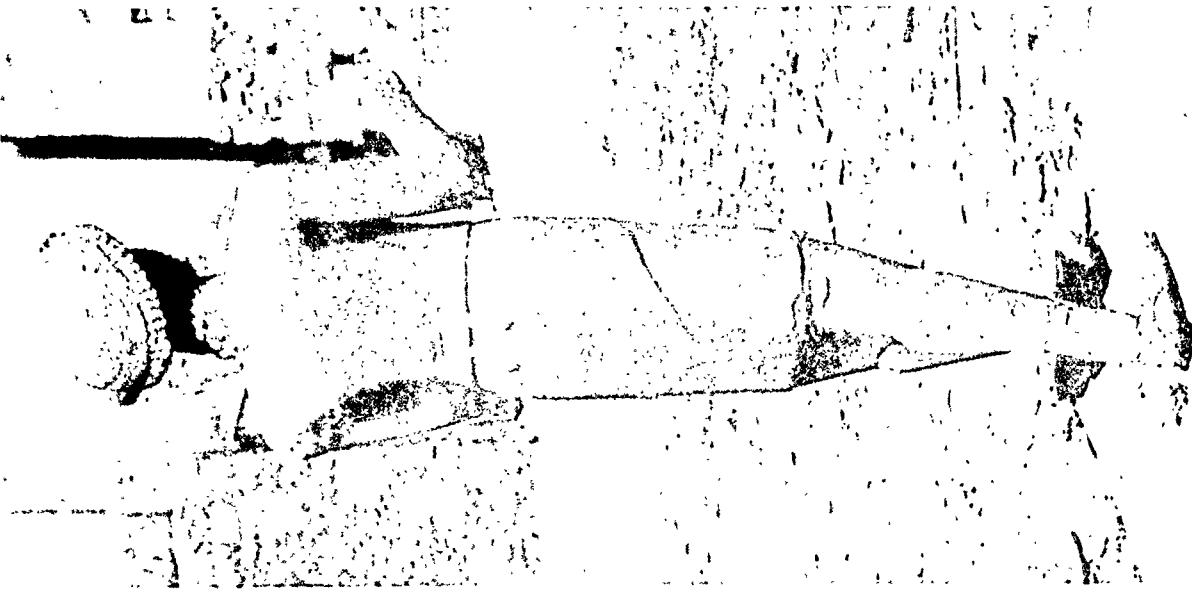


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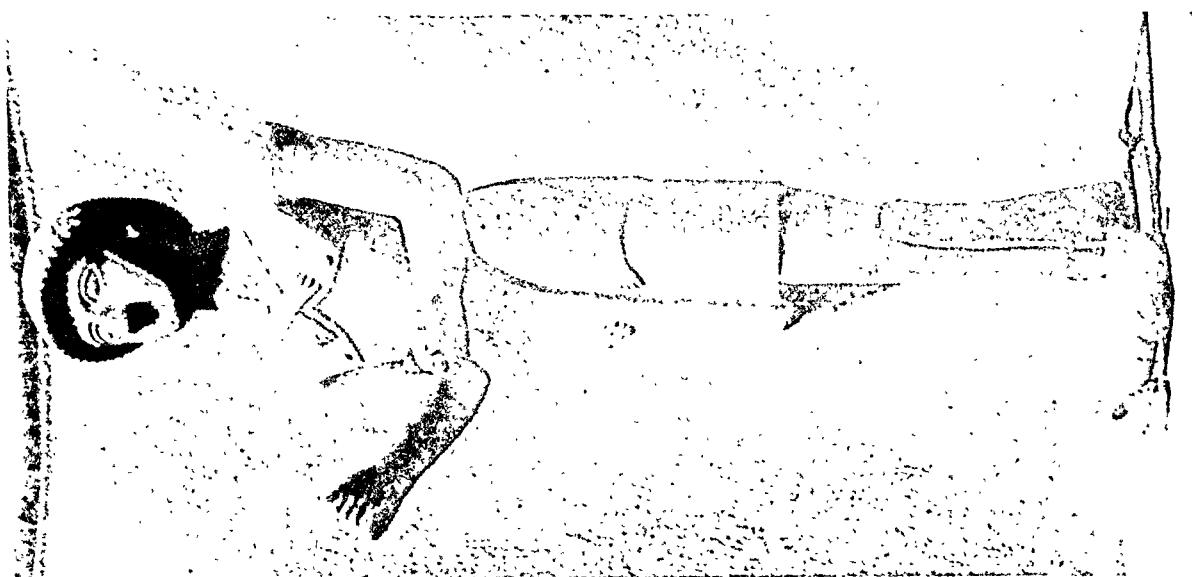
194. Pottery and stone vessels.



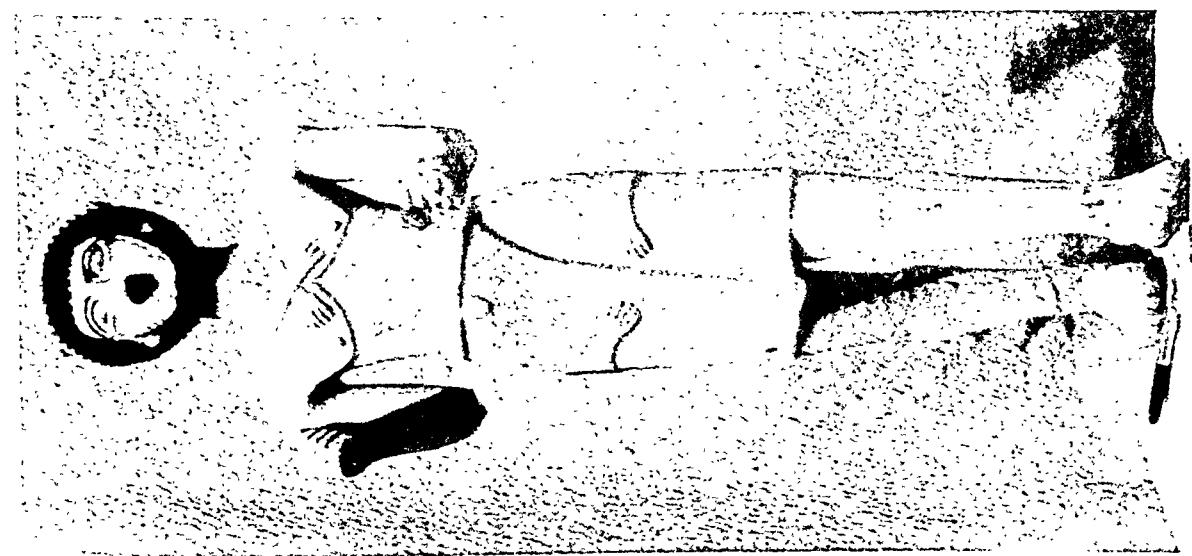
195. Stone and bronze objects.



196. Bronze statue of Ma'adkarib
(Catalogue no. 11).



197. Bronze statue of Ma'adkarib
(Catalogue no. 11).



198. Bronze statue of Ma'adkarib
(Catalogue no. 11).



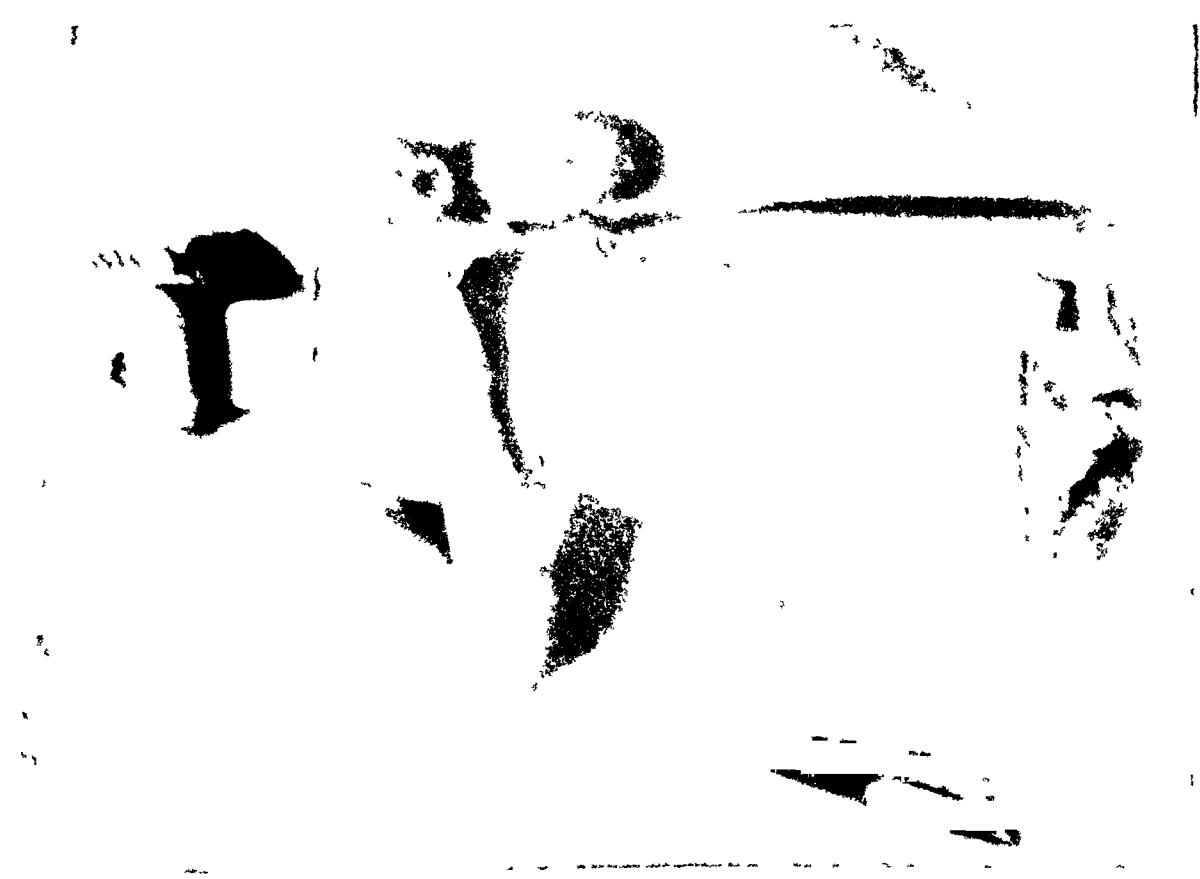
199. Bronze statue (Catalogue no. 12).



200. Bronze statue (Catalogue no. 12).



202 Bronze statue (Catalogue no. 13).



201. Bronze statue (Catalogue no. 13).



203. Head of bronze statue (Catalogue no. 13).



204. Arm of bronze statue (Catalogue no. 14).



205. Foot of bronze statue (Catalogue no. 18).



206. Marble head (Catalogue no. 40).



207. Marble bull (Catalogue no. 49).



208. Marble bull (Catalogue no. 53).

Appendix V

MARGINALLY DRAFTED, PECKED MASONRY

Gus W. Van Beek

Marginally drafted and pecked masonry, which was used in the construction of the oval wall and entrance of the 'Awwām temple (see Plates 160, 165, 166, 185), the mausoleum, and the southern sluice walls of the great dam at Mārib (see Plate 86), is particularly important for South Arabian chronology. The fact that these structures are built with masonry of this type is significant in itself because it suggests that they may belong to the same general period of construction. But more than that, the appearance of marginally drafted, pecked masonry at a number of other South Arabian sites, where several examples exhibit technical and stylistic differences, indicates that an orderly development of this style with chronological implications may be reasonably assumed. Furthermore, the occurrence of similar masonry in well-dated sites outside this area provides a useful tool not only for dating the appearance of this style and the South Arabian structures in particular, but also for determining the cultural influences that played a rôle in the history of South Arabia.

Careful examination of the masonry of the oval wall and the entrance hall of the 'Awwām temple reveals a number of important technical and stylistic differences, some of which are described by F. P. Albright (pp. 217, 223, 233). In the lower courses of the oval wall below the inscription on courses 13 and 14, see Plate 216, the blocks are dressed with smooth, proportionately narrow, drafted margins on all four edges of the face. faint chisel marks on some of the

blocks indicate that the upper and lower margins were tooled vertically, and the side margins horizontally. The centers are pecked with close, shallow strokes having no characteristic direction and are on the same plane as the margins. Traces of a line cut on the inner edges of the margins to define the area to be pecked are preserved on a few blocks. Above course 13 of the oval wall, in the lower courses of the entrance hall, and in the mausoleum, the blocks are dressed in the same technique, but exhibit certain changes in style (Plates 209, 165, 166, 176). The drafted margins are slightly wider, particularly on the upper and lower edges; the vertical and horizontal chisel marks on the margins are not as carefully smoothed and are clearly visible on every block; the pecking is coarser and more uneven with a higher density of deep strokes; the line delimiting the pecked area is nearly always preserved. A study of the margins on the inscribed courses, (13 and 14), shows that they belong stylistically with the upper rather than the lower courses of the wall. A group of later structures, adjoining the entrance hall on the north was built with masonry superficially similar to, but technically different from, that of the oval wall and the entrance hall (p. 233). The blocks are smoothed vertically over the entire faces; the centers are pecked sparingly in a horizontal direction leaving broad irregular borders of the original vertical dressing on the edges of the face. It is important to note that these borders or margins are not true drafted margins

although at first glance they bear a resemblance; they serve only as a frame for the pecking in the center.

To the best of my knowledge, the masonry in the southern sluice structure of the Mârib dam has never been described. An examination of the photographs of this structure (Plates 210, 86) shows that marginally drafted pecked masonry was used in its construction, but with notable technical and stylistic differences in the dressing of the blocks. The upper and lower drafted margins are very wide, although the width varies in different courses and even within the same course. The juncture of the margins with the pecked center is irregular, and there are no indications of the incised line used to define the pecked area in the photographs. Some of the blocks in courses 8 to 10 and 17 (counting down from the topmost preserved course, see Plate 86) were never finished and, for that very reason, are technically instructive. These blocks have drafted margins on all edges of the face and a boss in the center which has not been cut back to the plane of the face. They enable us to reconstruct successive steps in dressing the blocks with some probability. After the stone was removed from the quarry and the block was roughly shaped, margins were drafted on the edges of the face to facilitate the alignment of the block in the wall. The center of the face, which resembled a high boss, was then cut back to the plane of the face leaving a series of close peck marks on the surface.

Whether the high central area was removed at the quarry or after the block was laid in the wall cannot be determined with certainty, although the former is more probable. The fact that a few unfinished blocks with high centers are surrounded on every side by properly dressed blocks is hard to explain if they were dressed after being laid. On the other hand, it is reasonable to assume that the builder occasionally accepted unfinished blocks in his haste to complete the structure.

Even though the blocks of this particular structure may have been dressed before being laid in the wall, we cannot assume that this practice was universal; there is abundant evidence elsewhere that the blocks were dressed after the wall was structurally complete, e.g., the oval wall of the 'Awwâm temple and the platform Takht-i Madar-i Sulaiman at Pasargadae. If these blocks

were drafted and pecked before being placed in the wall, the explanation for this departure from the more normal procedure should perhaps be sought in the nature of the structure itself or the terrain upon which it stands.

In any case, the sequence of (1) drafted margins and (2) removal of the central boss is established in the blocks of the sluice wall. It was almost certainly used also in dressing the blocks of the 'Awwâm oval wall and entrance hall, but does not appear in the blocks of the later outer structures north of the entrance hall. There are, then, four varieties of marginally drafted, pecked masonry at Mârib which are represented by (1) the lower courses of the oval wall, (2) the upper courses of the oval wall, the entrance hall, and the mausoleum, (3) the southern sluice structure of the dam, and (4) the rooms adjoining the entrance hall on the north.

Pecked masonry with drafted margins is also found at a number of other South Arabian sites. It occurs in the outer wall of the temple of 'Ilumquh¹ and in the walls of the structures known as the Dar Bilqis at Sirwâh.² Although a detailed description of the masonry of the temple of 'Ilumquh is impossible owing to the poor quality of Fakhry's photograph (Fakhry, Part III, Pl. IV), the narrow drafted margins in the middle courses are visible and appear to be stylistically similar to those found on the oval wall at Mârib. It is important to note in this connection that the style of masonry in the foundations of this structure (the lowest 2 or 3 courses above the present ground level) fully corresponds to that used in the foundations of the Mârib oval wall (course 43 and those immediately above) as described by F. P. Albright (p. 217, but no photograph); margins are drafted on the edges of the face, and the face is left rough and projecting above the plane of the margins as a high central boss. This equation is further supported by the inscription (CIH 366) on the wall naming Mukarrib Yadi'l Dhirrih, the son of Sumuhu'lalay, as builder. Since the same person is known to have built the lower part of the oval wall at Mârib (and probably all of the wall from the foundations up to and including course 15 as will be shown below), it is probable that the style of masonry in the 'Ilumquh temple at Sirwâh, is

¹ A. Fakhry, *An Archaeological Journey to Yemen* (Cairo, 1951), Part III, Pls. III, IV.

² *Ibid.*, Pls. XII A and B.

the same as that of the lower courses of the Mârib oval wall. It was also used in the north building of Dar Bilqis, but only a small portion of the blocks are shown in the photographs (Fakhry, Part III, Pl. XII A, B) and stylistic classification is impossible.

It is also found in the enclosure wall and the western gateway of Ma'in.³ Here the masonry exhibits a number of important technical and stylistic changes which represent a wide departure from the style of masonry used in the upper courses of the oval wall and the entrance hall at Mârib (Plate 211). The width of the drafted margins, particularly the side margins, is proportionately greater; the margins are nearly always tooled obliquely as shown by clear chisel marks. The pecked centers often project slightly above the plane of the margins; the pecking is very coarse with large deep marks predominating. The pecking tends to be oblique, but in the opposite direction from the oblique tooling of the margins.

Before leaving Ma'in, two other observations must be made. F. P. Albright has noted (p. 223) that in the walls of the entrance hall at Mârib, blocks are occasionally found with a vertically drafted margin simulating a rising joint across the middle of the face. To judge from Fakhry's photograph (Part III, Pl. LVI), the long corner block in the uppermost preserved course of the gateway is an example of this technique; there are two additional drafted margins toward the center indicating false joints. This technique is important because it not only suggests a close relationship between these two structures, but also serves as the stylistic prototype for the later wall panels which will be described below.

It is also noteworthy that marginally drafted, pecked masonry is used as a decorative motif on some of the piers at Ma'in (Tawfik, Figs. 9, 13; Fakhry, Part III, Pl. LVII) and at Berâqish (Fakhry, Part III, Pl. LIV). The writer knows of no other examples in South Arabia, and it may be a local development.

At Berâqish, marginally drafted, pecked masonry appears in the enclosure wall, a photograph of which is mistakenly identified as Sirwâh (Fakhry, Part III, Pl. XIII).⁴ In general the style

and technique of dressing is similar to that of the Ma'in enclosure wall; it differs from the latter only in the random pecking of the central areas and in the dressing of the pecked centers back to the plane of the margins, although the apparent evenness of margins and centers may be due to the rather flat lighting of the wall in the photograph. Provisionally we can associate this style with that found on the coping of the phase A temple at Ḥureidha which will be described below.

In the temple at Ḥuqqa, marginally drafted, pecked masonry was not found; but many wall panels imitating masonry of this type were discovered which, to judge from Rathjens' and von Wissmann's description and drawings,⁵ are identical in style and technique with those found at Hajar bin Ḥumeid (see below).

In the 'Athtar temple at Timna', marginally drafted, pecked masonry appears in the eastern staircase leading to the sanctuary, in a staircase built into one of the large niches on the outside of the south wall (Plate 212), and on several blocks that are no longer *in situ*. Since all examples are stylistically identical, we will limit our description to the best-preserved example in the south staircase. This staircase belongs to a period later than that of the preceding temple, which was constructed of massive undressed masonry. In both style and technique, the dressing of the staircase corresponds to that used on the lower courses of the oval wall at Mârib. The only difference is in the juncture of the pecked centers and the drafted margins; in the Timna' staircase, it is more sharply defined and the pecking rarely crosses over the incised line that defines the limits of the pecked area. The blocks here are much smaller than those in the oval wall, as one would expect, since their over-all dimensions were obviously determined by the size of the structure for which they were intended. None of the buildings excavated in the South Gate area was constructed with marginally drafted, pecked masonry, which suggests that, at least in Qatabân and possibly elsewhere, the use of this masonry ceased about the end of the second or the beginning of the first century B.C.

A number of examples of this masonry were discovered in the Timna' cemetery at Ḥeid bin

³ *Ibid.*, Pls. LVI and LVIII, and M. Tawfik, *Les monuments de Ma'in* (Cairo, 1951), Figs. 30-39.

⁴ I am indebted to A. Jamme for the correct identification of the site.

⁵ C. Rathjens and H. von Wissmann, *Vorislamische Altertümer* (Hamburg, 1932), pp. 49 f. and Figs. 15, 16.

'Aqîl. W. F. Albright informs me that several blocks dressed in this style were found *in situ* in the Rîşâfum temple; others were found scattered through the filling of the deep shaft located near the base of the site. The dressing of most of these blocks is typologically similar to that of the blocks in the temple staircase; on others, it is technically closer to that employed on the outer buildings of the 'Awwâm entrance hall.

At Hajar bin Humeid, one block was found which was dressed in a style resembling that used on the blocks in the structures adjoining the 'Awwâm entrance hall on the north (Plate 213 right center). This block was not found *in situ* and no structures built of masonry of this type came to light in the area excavated. But many blocks were discovered, the dimensions of which indicate that they were used as wall panels (Plate 213). These blocks are smoothed over the entire face. On each, two or three rows of rectangles or panels are incised to imitate individual blocks in several courses of masonry. The central area of each panel is sparsely and obliquely pecked to resemble the centers of true marginally drafted, pecked masonry. The panels are separated by borders, 2 to 3 cm. wide, which simulate marginally drafted, bedding and rising joints. These wall panels show an obvious attempt to imitate the earlier marginally drafted, pecked masonry and should be considered as the product of an archaizing period.

Marginally drafted, pecked masonry may have been used in the wall of the so-called palace at Hajar near Shabwa, judging from Philby's photograph,⁶ and in the "Astarte" temple, according to Philby's equation.⁷

It is also found on the coping of the earliest (phase A) temple at Ḥureidha.⁸ Miss Caton Thompson's excellent description (accompanied by photographs) of the masonry need not be repeated here;⁹ we shall limit ourselves to those features that are pertinent to this discussion (Plate 214). The drafted margins are proportionately wide on all edges and are tooled

⁶ H. St. John B. Philby, *Sheba's Daughters* (London, 1939), opposite p. 84, bottom photograph.

⁷ *Ibid.*, p. 92.

⁸ Provisionally phases A and B are assigned to the period from the middle of the fifth century to the fourth century B.C. See G. Caton Thompson, *The Tombs and Moon Temple of Ḥureidha (Hadramaut)* (Oxford, 1944), p. 153.

⁹ *Ibid.*, pp. 22, 57, Pl. V: 1, IX: 1, 2.

obliquely. The incised line which was often used to define the pecked area is conspicuously absent, and the junctures of the pecked centers with the drafted margins are normally irregular and wavy. The pecking is dense, coarse, and without direction; the pecked centers are dressed back to the plane of the margins. In general it is stylistically similar to the masonry of the enclosure wall at Berâqish. By phase B of the Ḥureidha temple, the style has changed significantly.¹⁰ Margins are no longer drafted on the sides, but only on the upper and lower edges of the face. The margins continue to be tooled obliquely; pecking is replaced by rough tooling in the centers. In general, the dressing technique used on these blocks is similar to that found on the uppermost foundation courses of the Berâqish enclosure wall (see the lowest course and a half in Fakhry's photograph, Part III, Pl. XIII). Whether this similarity points to a technical and stylistic decline of this masonry at Ḥureidha or to the re-use of foundation blocks in the phase B coping cannot be determined. No examples of marginally drafted, pecked masonry were found in the phase C occupation.¹¹ Before leaving Ḥureidha, we must call attention to the fragment described in the Ḥureidha volume on p. 56 and illustrated on Pl. 20: 3. In view of its thinness and flat underside, there can be little doubt that it is a fragment of a wall panel, imitating marginally drafted, pecked masonry. It differs from the Hajar bin Humeid and Ḥuqqa panels in two respects: (1) the pecked centers project above the drafted margins, reminiscent of the masonry in the western gateway of Ma'in, and (2) the sparse pecking falls in vertical rows. Although these panels were not found *in situ*, the resemblance to the late masonry at Ma'in and the fact that wall panels imitating this masonry are late elsewhere suggest that they should be assigned to the C or post-C phase at Ḥureidha.

At this stage in the recovery of ancient South Arabia, we cannot develop a typological sequence of marginally drafted, pecked masonry that is absolutely certain in all details. Nevertheless, the direction of the technical and stylistic evolution of this masonry is clear. The finer dressing is the oldest; it gradually declines in quality

¹⁰ *Ibid.*, p. 31, Pl. IX: 3.

¹¹ On the date of the Phase C occupation, see also Bowen, Appendix IV, "Dating the Ḥureidha Irrigation Ruins."

during succeeding periods and finally it is discarded altogether. Tentatively the above-mentioned examples can be typologically arranged in the following sequence beginning with the earliest style:

1. Lower courses of oval wall of 'Awwām temple at Mārib; south staircase of 'Athtar temple at Timna'; Rīṣāfum in the Timna' cemetery; probably outer wall of 'Ilumquh temple at Sirwāḥ.

Characterized by: Smooth, proportionately narrow, drafted margins on all edges of face; upper and lower margins tooled vertically, side margins horizontally; incised line defining limits of pecked area seldom visible since pecking runs into and occasionally across it; centers pecked back to plane of margins; close, shallow, random pecking.

2. Upper courses of oval wall, lower courses of entrance hall of 'Awwām temple at Mārib.

Characterized by: Wider drafted margins, particularly on upper and lower edges; little or no smoothing of chisel marks on vertically tooled upper and lower margins and on horizontally tooled side margins; incised line defining pecked area often clearly visible since pecking sometimes stops short of it; usually pecking strokes are deeper and wider, giving coarse and uneven appearance; pecked centers dressed back to plane of margins.

3. Phase A coping of Ḥureidha temple; enclosure wall at Berāqish.

Characterized by: Broad drafted margins on all edges of face; margins tooled obliquely; pecking coarse and without direction; no incised line so that juncture of pecked area with margins is irregularly defined; pecked centers dressed back to plane of margins.

4. South sluice structure Mārib dam; enclosure wall and western gateway at Ma'in.

Characterized by: Broad drafted margins on all edges of face, unusually wide upper and lower margins on sluice structure; margins tooled obliquely; pecking coarse with large, deep marks; irregularly defined juncture of centers with margins; pecked centers seldom dressed back to plane of margins; pecking occasionally oblique, but in opposite direction from oblique tooling of margins, particularly at Ma'in.

5. Outer north building of 'Awwām entrance hall at Mārib.

Characterized by: Vertically smoothed face; no drafted margins; borders of original vertical dressing in reserve; pecking sparse and horizontal in direction. Imitation of nos. 1-3 in style, but in different technique. Probably archaizing.

6. Huqqā and Hajar bin Humeid wall panels.

Characterized by: Smoothed face; on each panel, blocks and courses simulated by incised lines defining borders and pecked areas; pecking sparse and oblique in direction. Imitation of nos. 1-3 in style, but in different technique. Probably archaizing.

Unaccounted for in this list are the phase B coping of the Ḥureidha temple and the wall panel fragment from Ḥureidha. The former is stratigraphically later than type no. 3, but remains an enigma, unless we assume that it is a re-used foundation block. The latter shows certain affinities to type no. 4 in style and type no. 6 in function; it may be a local development within type no. 6.

Until more material is forthcoming, the above sketch can be no more than provisional. The duration of each style, the existence of gaps, and the nature of local differences remain uncertain.

Miss Caton Thompson has suggested that the source of the South Arabian pecked, marginally drafted masonry may be Persia, Phoenicia, or Greece.¹² Actually it represents a refinement of the earlier "rusticated" masonry (blocks with marginal drafting and central bosses) found in the Israelite stratum at Samaria (ninth century B. C.),¹³ in the Solomonic buildings at Megiddo (second half of the tenth century B. C.),¹⁴ level V at Beth-shan (probably belonging to the Solomonic era),¹⁵ in the Phoenician harbor at Tyre, according to Crowfoot,¹⁶ and in the proto-Phoenician stratum at Ugarit (thirteenth century B. C.).¹⁷ Since masonry of this type first

¹² *Op. cit.*, p. 57.

¹³ See G. A. Reisner, C. S. Fisher, D. G. Lyon, *Harvard Excavations at Samaria* (Cambridge, 1924), I, pp. 104 ff.; II, Pl. 27A; and especially J. W. Crowfoot, K. M. Kenyon, E. L. Sukenik, *The Buildings at Samaria* (London, 1932), pp. 5 ff., Pls. XIII, XXXI, XXXII.

¹⁴ R. S. Lamon, G. M. Shipton, *Megiddo I* (Chicago, 1939), p. 13, Figs. 15, 27, 52.

¹⁵ G. M. FitzGerald, "Excavations at Beth-Shan in 1931," *Palestine Exploration Fund Quarterly Statement* (1932), pp. 139 ff., Pl. I.

¹⁶ *The Buildings at Samaria*, p. 6.

¹⁷ F. A. C. Schaeffer, "Les Fouilles de Minet-el-Beida et de Ras-Shamra, Deuxième Campagne," *Syria*, 12 (1931), pp. 6 f. and Pl. XII 1, 3; and "Les Fouilles de Minet-el-Beida et de Ras-Shamra, Troisième Campagne," *Syria*, 13 (1932), Pl. XV 3.

appears in Phoenicia and since it is completely foreign to Palestine, having been used there for only a century or so, as Crowfoot has emphasized,¹⁸ there can be no doubt that it is Phoenician in origin. In this connection, it should be noted that the earliest occurrence of "rusticated" masonry in Greece, the archaic wall at Miletos (second half of the sixth century B.C.), must be related to the Near Eastern examples, as recognized by Scranton,¹⁹ and probably represents a direct borrowing from the Near East through Phoenician mediation.

Evidence available at this time indicates that the transition from "rusticated" to marginally drafted, pecked masonry probably took place in Assyria during the first half of the seventh century B.C. Both Sennacherib's aqueduct at Jerwan²⁰ and the foundation of the west gate at Assur²¹ are constructed of blocks with drafted margins and high central bosses that are technically similar to the earlier examples of "rusticated" masonry. While some of the high bosses

¹⁸ *Op. cit.*, p. 7. To Crowfoot's statement we must add the Biblical evidence (*1 Kings 5: 31*) which makes it clear that Solomon employed masons from Tyre and Byblos (the Gebalites, see now J. A. Montgomery, *The Book of Kings*, The International Critical Commentary [New York, 1951], pp. 137 f.). There can be little doubt that these masons used their own techniques of construction and dressing and thus introduced them into Palestine.

¹⁹ R. L. Scranton, *Greek Walls* (Cambridge, 1941), pp. 129 f.

²⁰ T. Jacobsen, S. Lloyd, *Sennacherib's Aqueduct at Jerwan* (Chicago, 1935), p. 9, Pls. 9B, C.

²¹ W. Andrae, *Die Festungswerke von Assur* (Leipzig, 1913), text p. 51, Pl. 22, Fig. 58; Pl. 26, Fig. 68. It is assigned to the late Assyrian period. It should be noted here that the number of examples of "rusticated" masonry in Assyria is increasing rapidly. At Nimrud, Mallowan has found examples in the "Burnt" palace (see his excavation reports in *Iraq* 14 [1952], p. 18 and *Iraq* 16 [1954], p. 74), in the foundations of the quay-wall (*Iraq* 15 [1953], pp. 38 ff.), and in the foundations of the "Southeast" palace (*Iraq* 16 [1954], pp. 84 f.) and of the Nabu temple of the Ezida (*Iraq* 19 [1957], pp. 26 f.), all of which probably belong to the eighth century, with possible extensions back to the late ninth (the quay-wall) and down to the early seventh century (the "Burnt" palace). Similar masonry has been found in the foundations of the Haldis temple at Toprak Kale (see C. F. Lehmann-Haupt, *Armenien Einst und Jetzt* II, 2 [Berlin, 1931], pp. 458 ff. with sketch on p. 460), which is provisionally dated in the late eighth century B.C. by R. D. Barnett ("The Excavations of the British Museum at Toprak Kale near Van," *Iraq* 12 [1950], p. 33). If these examples belong to the eighth century, as seems to be the case, we have a continuous use of "rusticated" masonry from the tenth into the seventh century B.C. The Assyrians, like the Palestinians, probably borrowed the style from the Phoenicians.

remain, many have been trimmed back to or slightly above the plane of the drafted margins and dressed with both a broad- and a pointed-pickaxe.

A later and slightly different style appears in the masonry of the unfinished platform Takht-i-Madar-i Sulaiman at Pasargadae which is generally assigned to the reign of Cyrus the Great (559-530 B.C.).²² Thanks to Dr. Myron B. Smith, the ranking authority on Iranian architecture, who generously lent us both his notes and photographs of this monument, the masonry can be described in detail. The edges on the face of each block were drafted lower or deeper than the central area of the face and dressed smooth; the upper and lower margins were tooled vertically and the side margins horizontally. The central area, which appears to be a high, irregular boss in its unfinished state, was intended to be cut back to or slightly above the plane of the margins and closely pecked, as shown by the preliminary dressing around the margins.²³ The few small areas that were almost finished suggest that if the dressing of the blocks had been completed, it would have been virtually identical with the South Arabian style.

A further similarity should be noted. Smith has pointed out that there are false horizontal joints on the blocks which form the foundation courses.²⁴ Although they are horizontal, they may be related to the false vertical joints in the 'Awwām entrance hall and the Ma'in gateway and may point to a common technique.

Apparently the popularity of marginally drafted, pecked masonry was short-lived in Persia and the style was abandoned before the construction of Persepolis and the platform Takht-i-Rustam, located about 3 kilometers to the north. What Schmidt describes as ". . . stone blocks . . . with a smooth, slightly projecting frame inclosing a pebbled area"²⁵ is actually *anathyrosis*²⁶ and never occurs as finished dressing on

²² E. F. Schmidt, *Persepolis I* (Chicago, 1933), p. 21, Fig. 13A; E. E. Herzfeld, *Iran in the Ancient East* (Oxford, 1941), Pl. XL.

²³ Smith's unpublished photograph L.II.11.

²⁴ He cites as reference E. Flandin, P. Coste, *Voyage en Perse: Perse ancienne*, IV, Pl. cci.

²⁵ *Op. cit.*, pp. 56 f., Figs. 19A-B.

²⁶ The edges are dressed smooth and the area enclosed is roughly tooled below the plane of the edges, thus permitting the mason to fit the blocks tightly with a minimum of labor. See D. S. Robertson, *A Handbook of Greek and Roman Architecture*, 2nd ed. (Cambridge, 1913), p. 42.

the outer face of blocks at the site. Since the style was commonly employed in monumental construction, one would expect to find it at Persepolis if it were still in use. In view of these facts, it is highly improbable that the style originated there, as has been suggested, and almost certainly wrong to label it "Achaemenian."

Related, though not identical masonry has been found in Phoenicia, at Bostan esh-Sheikh near Sidon.²⁷ The building belongs to the early fourth century B. C. according to W. F. Albright,²⁸ and continues into the Greek period. It differs from our style in several respects; the drafted margins are beveled at the joints and the central boss is not trimmed back to the plane of the margins.

On Rhodes, masonry of this type is found in the terrace façade of Building B of the Artemis Temple at Kalydon which is dated c. 380-370 B. C.²⁹ Here the centers of the blocks are characteristically tooled or pecked; margins, however, are drafted only on the upper and lower edges, a stylistic variation common in Greece. The finest work on the narrow courses (J, M, P) is equal to the best of the South Arabian dressing.³⁰

It is also found in Greece and has been classified as "Isodomie Ashlar: Tooled Work, Drafted Edge" by Scranton.³¹ He states that the style, which first appeared in Greece in the fifth century B. C., attained its greatest popularity during the following century, c. 370-320 B. C., with most of the examples dating about 340-335 B. C. It is probable that the Greeks borrowed this style from the Near East just as "rusticated" masonry seems to have spread to Greece from that area a century earlier. The closest parallel in this area to our South Arabian style is the masonry of the terrace wall in the Marmaria at Delphi (Scranton's type D 6, 10) which is dated in the second quarter of the fourth century or slightly later.³²

²⁷ See Macridy-Bey, "Le temple d' Echmoun à Sidon, Fouilles exécutées par le Musée Imperial Ottoman," *Revue Biblique*, xi (1902), pp. 489-515, especially p. 498 and Fig. 5; and W. v. Landau, "Vorläufige Nachrichten über die im Eshmuntempel bei Sidon gefunden phönizischen Altertümer," *Mitteilungen der Vorderasiatischen Gesellschaft* (1904), 5, pp. 279-350, Figs. 4-5, Pl. ii.

²⁸ Oral communication.

²⁹ Ejnar Dyggve, *Das Laphrion, Der Tempelbezirk von Kalydon* (Copenhagen, 1948), pp. 30, 257 ff., Pls. VIa, XXVIII, Figs. 21-23.

³⁰ *Ibid.*, Figs. 30, 31.

³¹ *Op. cit.*, pp. 129 ff., 179.

³² *Ibid.*, p. 131.

On the basis of the rather scanty comparative material available at this time, it is impossible to draw more than tentative conclusions regarding the origin, general diffusion, and date of marginally drafted, pecked masonry. The evidence at hand seems to indicate that this style developed from "rusticated" masonry, which was relatively common in the Near East from the twelfth through the seventh centuries B. C. In Assyria, and possibly elsewhere, during the early part of the seventh century B. C., a new dressing technique was introduced in which the rough, high central boss was cut back to the plane of the margins and the resulting panel was tooled or pecked. From this area the technique presumably spread to South Arabia, Persia, and Phoenicia, where it was subject to local modifications. Because of the strong ties that linked Assyria and its empire with South Arabia,³³ no more than a few years would have been necessary for the transmission of this style of dressing to South Arabia. There it must have found immediate and wide acceptance owing to the abundance of good limestone. Thus we can place the appearance of marginally drafted, pecked masonry in South Arabia about the middle of the seventh century B. C.

Type I, to which the finest examples of this masonry belong, first appeared at this time. Although it is typologically more advanced than the slightly earlier Assyrian examples, only a few years would have been required for the South Arabian masons to develop the technical and stylistic modifications apparent in the lower courses of the oval wall at Mârib. Epigraphic evidence enables us to date the lower courses of the oval wall and to set the upper limits of type I with a high degree of probability. It will be remembered that, according to Glaser 484 = CIH 957, a *Mukarrib* Yadi'il Dhirrih, the son of Sumuhu'alay, built the oval wall of 'Awwâm. There can be little doubt that he is responsible for all of the lower courses of this wall. This inscription, located on the 28th course from the top of the wall on the east side, clearly belongs to the lower courses of the oval wall and is associated with masonry of type I; it is approximately 14 courses below the inscriptions on the

³³ See also W. F. Albright, "A Note on Early Sabaean Chronology," *Bulletin of the American Schools of Oriental Research*, no. 143 (1956), pp. 9 ff.; J. A. Montgomery, *Arabia and the Bible* (Philadelphia, 1934), pp. 58 ff.

north (Glaser 481 = CIH 375 = Jamme 550) and west (Glaser 485 = CIH 374 = Jamme 551) sides which described the dedication of the upper courses (above courses 14 and 13) of the wall, and it is 18 courses *above* the last foundation course excavated by F. P. Albright in his section farther around the wall on the south side (see p. 217). Though he does not give the specific number of courses of marginally drafted, pecked masonry below course 14, it is certainly found as low as course 34 (Plate 185), the level of the mausoleum on the east side, and probably continues down at least to courses 38-40, based on his description of the foundations. This means then that type 1 masonry is found in at least 6 courses and perhaps in as many as 10-12 courses, below the inscription. In view of these facts, we can safely attribute the foundations and the lower courses of the oval wall to Yadi‘il Dhirriḥ. Since Yadi‘il Dhirriḥ can now be dated about the middle, or early in the second half, of the seventh century B.C., according to the early Sabaean chronology proposed by W. F. Albright (based on a combination of palaeography and Assyrian synchronisms),³⁴ we can assign the lower courses of the present oval wall and the first use of type 1 masonry to this time.

That the middle of the seventh century B.C. is the upper limit for the appearance of marginally drafted, pecked masonry in South Arabia is strongly supported by the fact that no examples have been found in any South Arabian structure which is stratigraphically earlier than the south staircase in the ‘Ahttar temple at Timna’ or the lower courses of the oval wall at Mârib. All earlier phases of the Timna’ ‘Ahttar temple are built with completely different masonry. Of the structures excavated at Mârib, only the south tombs are earlier than the oval wall. It will be remembered that the masonry of these structures is dressed smooth and that an inscription with archaic forked top *H* and *ḥ* (see Albright’s Group A³⁵) was painted on one of the walls. Since this style of script disappears early in the seventh century, we have a *terminus ante quem* for the construction of these tombs. The use of smooth masonry here together with the Timna’ evidence indicates that marginally

drafted, pecked masonry had not yet appeared in South Arabia.³⁶

Soon after the middle of the fifth century B.C., type 1 was displaced by type 2. That the upper courses of the oval wall (from courses 13-14 upwards) belong to the latter half of the fifth century is conclusively shown by the inscriptions on courses 13 and 14 on the north (Glaser 481 = CIH 375 = Jamme 550) and west (Glaser 485 = CIH 374 = Jamme 551) sides, which describe the dedication of the wall from the inscribed courses to the coping during the reigns of several kings of Saba’ in the latter half of the fifth century (see p. 222). Whether type 2 was in use earlier than the middle of the fifth century B.C. cannot be determined with the evidence at hand. It is possible that the masonry in the upper courses does not reflect the extent of the decline in technique and style that had taken place by this time; the style in these courses may represent a deliberate (and generally successful) attempt to imitate, in the more degenerate technique of type 2, the finer style of the type 1 masonry in the lower courses. But for the present, we can only assert that type 2 had supplanted type 1 by the middle of the fifth century.

About the end of the fifth or early in the fourth century, type 3 replaced type 2 as indicated by the examples in the phase A coping of the Ḥureidha temple and the enclosure wall at Berāqish. With regard to the date of the phase A temple at Ḥureidha, we are in general agreement with Miss Caton Thompson, who assigned phases A and B to the period between the middle of the fifth and the end of the fourth centuries B.C.³⁷ If our typological analysis is correct, the upper limits of the phase A structure should be the last decade or so of the fifth century. For dating the enclosure wall at Berāqish, we have the inscrip-

³⁴ *Ibid.*, pp. 9 f.

³⁵ *Ibid.*, pp. 9 f.

³⁶ In the light of this study and a recent comparative examination of the pottery from the lowest level of the sounding against the east wall of the ‘Ahttar temple (called ‘Amir) with that of Hajar bin Humeid, W. F. Albright and the writer propose the following chronology for the ‘Ahttar temple. The first phase of the temple, the foundations of which were cut through the layer of the pottery mentioned above, must now be dated about the eighth century B.C. The second phase, built of massive undressed masonry and founded directly on the substructure of the first phase, we assign to about the early sixth century B.C. The south staircase, constructed in one of the niches of the second phase temple, followed soon after but in the same period; we also date it about the early sixth century B.C.

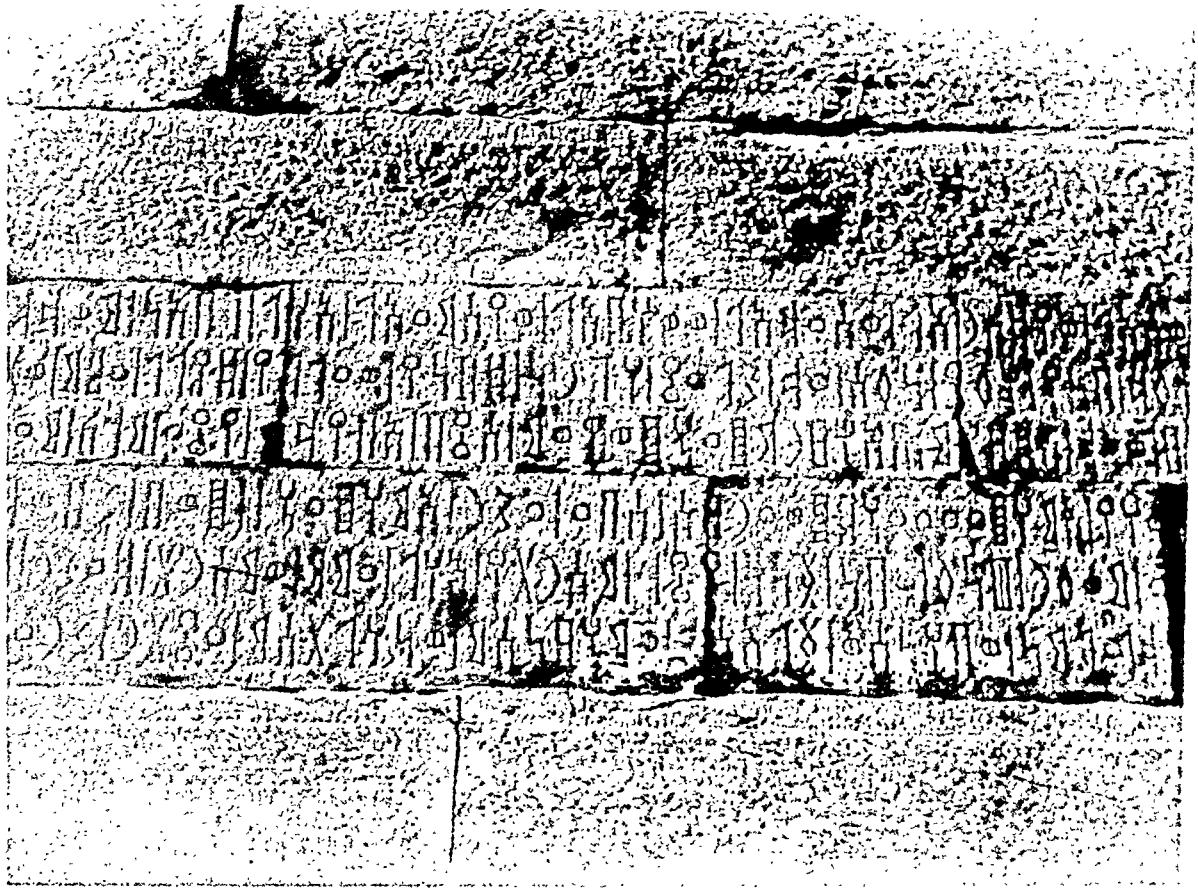
³⁷ See note 8 above.



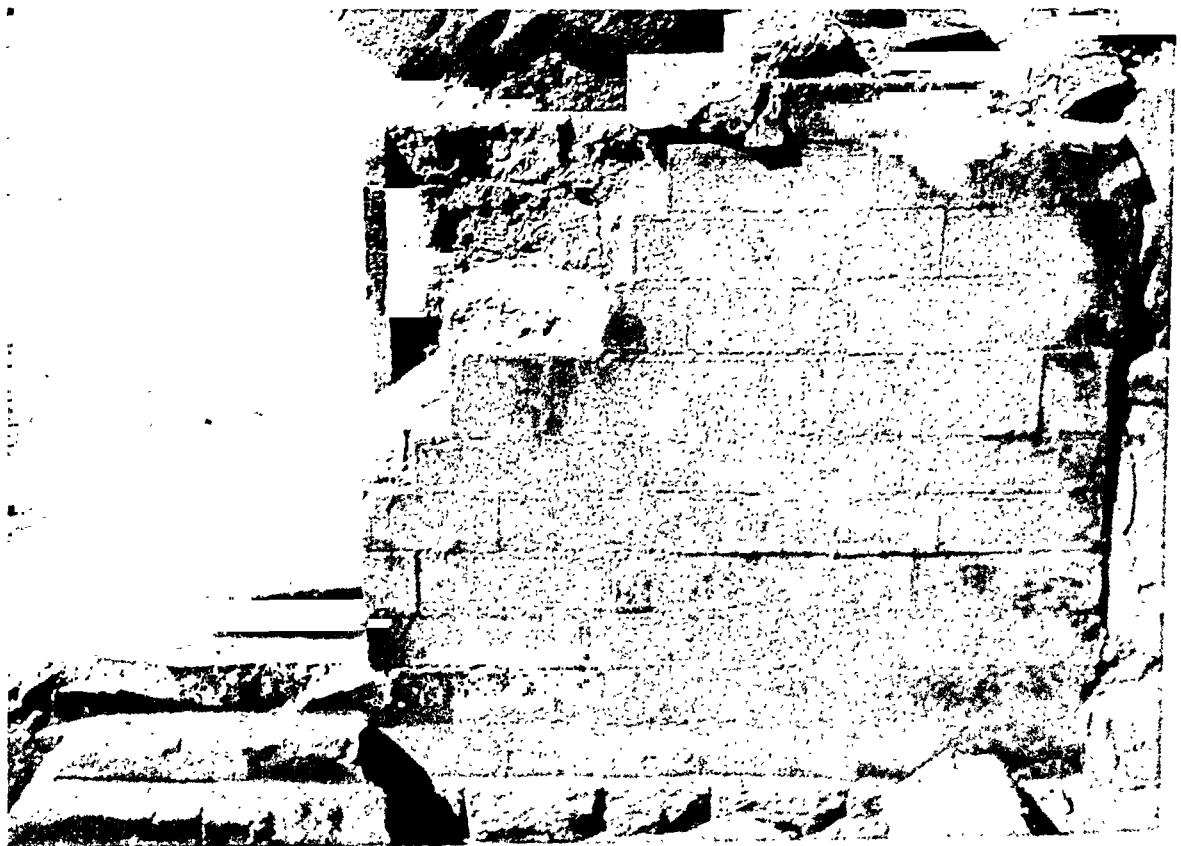
209. Masonry of the 'Awwām oval wall at Mârib. Type 1 masonry below the inscription; Type 2 masonry above.



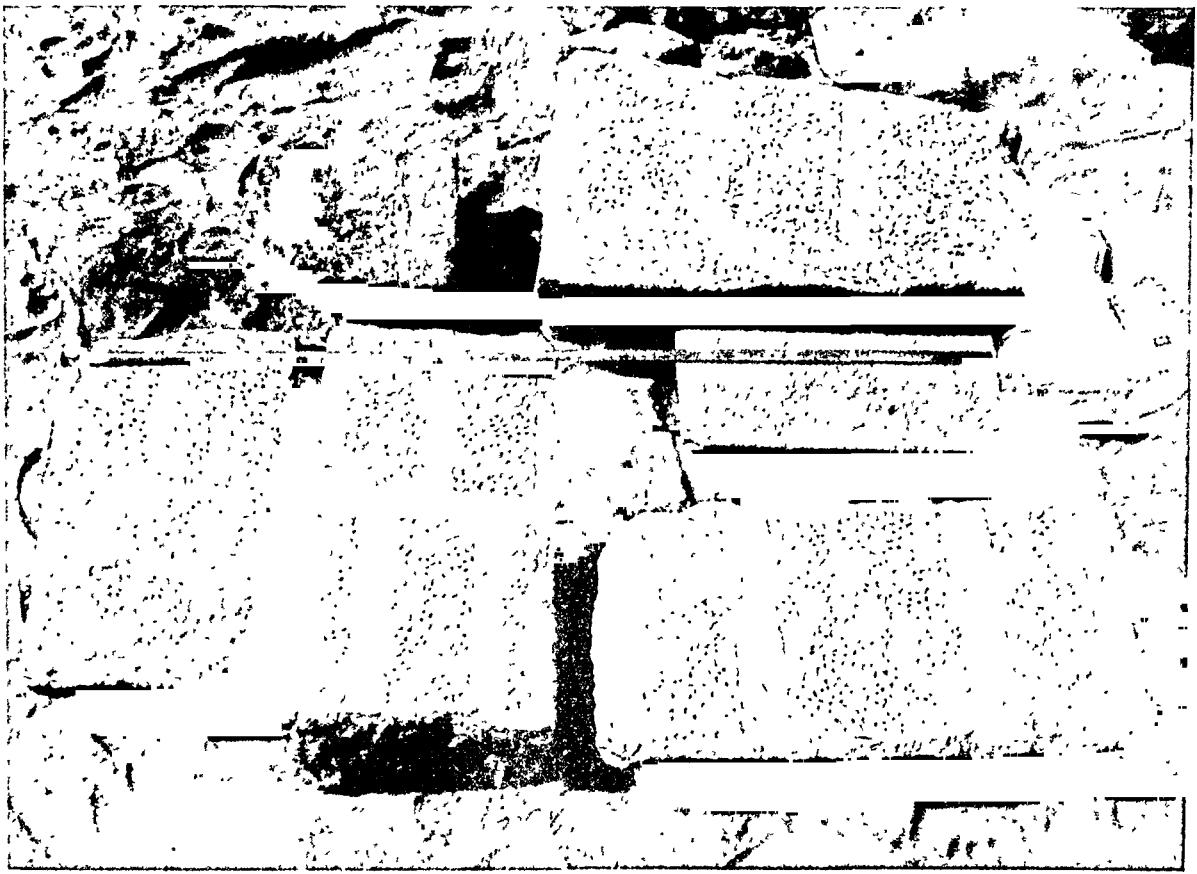
210. Southern sluice structure of the Mârib dam. Masonry provisionally assigned to Type 4.



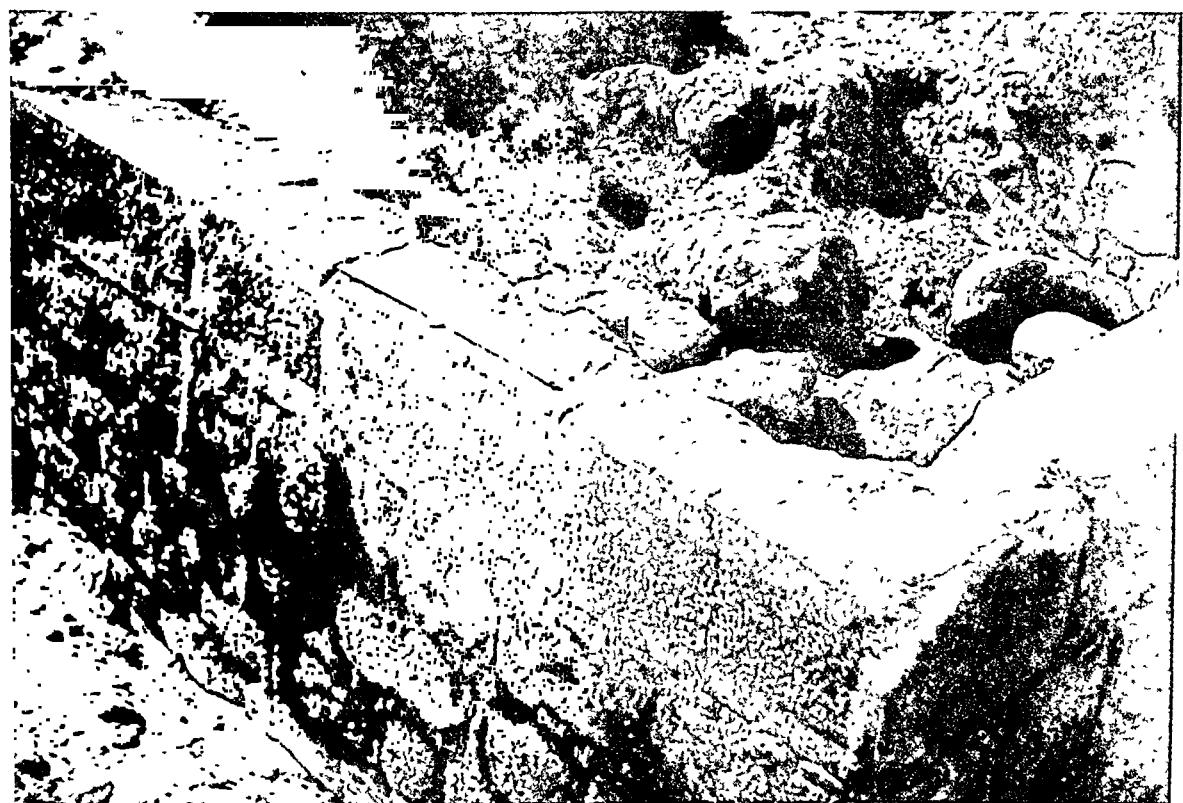
211. Type 4 masonry in the enclosure wall of Ma'in. (After Tawfik, *Les Monuments de Ma'in*, Fig. 31.)



212. Type 1 masonry in the south staircase of the 'Athtar temple at Timna'.



213. Wall panels from Hajar bin Ḥumeid, Type 6. Block in right center beneath tape probably belongs to Type 5.



214. Type 3 masonry in the coping of the phase A temple at Ḥureidha.
(After Caton Thompson, *The Tombs and Moon Temple of Ḥureidha*, Pl. v.)

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The following abbreviations are used in the General Index: K. = King; M. = Mukarrib;
W. = Wadi; n = note. All references are to page numbers.

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